DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL SERVICES

STAFF REPORT

√	PROPOSED COUNTY CODE AMENDMENT
√	PROPOSED PFM AMENDMENT
	APPEAL OF DECISION
	WAIVER REQUEST

New County Soils Map and Proposed Amendments to Chapter 107 (Problem Soils) of *The Code of the County of Fairfax, Virginia,* and the Public Facilities Manual Re: New Soil Survey.

Authorization to Advertise	April 26, 2011
Planning Commission Hearing	May 26, 2011
Board of Supervisors Hearing	June 7, 2011
Prepared by:	Code Analysis Division BJS (703) 324-1797 April 26, 2011

STAFF REPORT

A. Issues:

Adoption of a new County Soils Map, proposed amendments to Chapter 107 (Problem Soils) of *The Code of the County of Fairfax, Virginia* (County Code), and Chapter 4 (Geotechnical Guidelines), Chapter 6 (Storm Drainage), and Chapter 11 (Erosion and Sediment Control) of the Public Facilities Manual (PFM). The proposed amendments are necessary to align the County Code and PFM with the new Soil Survey for Fairfax County.

B. Recommended Action:

Staff recommends that the Board of Supervisors (the Board) adopt the new County Soils Map and the proposed amendments to Chapter 107 (Problem Soils) of the County Code and the PFM.

C. Timing:

Board of Supervisors authorization to advertise – April 26, 2011

Planning Commission Public Hearing – May 26, 2011

Board of Supervisors Public Hearing – June 7, 2011

Effective Date – June 8, 2011 at 12:01 a.m.

D. Source:

Department of Public Works and Environmental Services (DPWES)

E. Coordination:

The proposed amendments have been prepared by the Department of Public Works and Environmental Services and coordinated with the Office of the County Attorney. The proposed amendments to the PFM have been recommended for approval by the Engineering Standards Review Committee.

F. Background:

The original Soil Survey of Fairfax County was published in May 1963, by the United States Department of Agriculture (USDA) Soil Conservation Service [now the

Natural Resources Conservation Service (NRCS)] in cooperation with the Virginia Agricultural Experiment Station (Virginia Tech) and Fairfax County. The survey was based on field work that was completed in 1955. Approximately 60 percent of the County was mapped at that time. The Soil Science Office mapped some previously unmapped tracts of land for re-zonings, building permits and special studies. The Soil Science Office published its last survey update in 1990, and about 40,000 acres of unmapped land remained. The Soil Science Office was closed in 1996.

Intense growth and development drastically changed the landscape of Fairfax County between the 1963 soil survey and the commencement of the NRCS soil survey in 2002. The County needed a new soil survey that would account for the changes and map the previously unsurveyed 40,000 acres. As a result of the lack of information on several parcels of land, especially in the eastern part of the County, the County requested NRCS to complete the mapping of these areas.

The survey was conducted by NRCS in collaboration with Fairfax County and the Northern Virginia Soil and Water Conservation District (NVSWCD). Field surveying was performed by NRCS and NVSWCD soil scientists. The mapping and data collection have gone through quality control and assurance processes and were scanned and digitized by NRCS.

There is a significant increase in the amount and type of information available about soils in the County. Because of the advances and refinements in soil science, certain soils are renamed and there are a few newly created names. The survey is certified to USDA National Cooperative Soil Survey standards and incorporated into the USDA's National Soil Information System database. The updated soil survey was published in its entirety (maps, descriptions, interpretations and tables) by NRCS in 2008 and is available on the USDA's Web Soil Survey website and Soil Data Mart website.

The information from the updated soil survey has been integrated into the County's GIS system. The soils mapping has been transferred onto the County's real property identification maps to create the County Soils Map, which is available to the general public on the County's website through the Digital Map Viewer.

The soil problem classes were reformulated in accordance with NRCS standards and applied to all soil types in the new survey. The new problem classes more closely resemble those employed in Loudoun and Prince William counties so as to cause less confusion for private industry. One major difference is that the disturbed soils, which are mapped only in Fairfax, have their own separate problem class.

The differences between the updated survey and earlier surveys are summarized below:

1. The entire County has been surveyed and mapped to national standards at a scale of 1"=1,000'.

2. The soil maps are accessible online through both the County website, and the NRCS website. The descriptions, properties and technical data can be accessed online through the NRCS website.
3. Several soil names have changed for consistency with the national naming standards.
4. The soil maps connect at the borders with soil maps from surrounding counties.
5. Previously, only small tracts of land were identified as "made land" or "cut or fill." The new survey identifies large tracts of land that have been developed or altered. They are identified as "Disturbed soils" or "Urban Land." Specifically, disturbed soils are soils that have been mixed, graded, compacted or altered. Urban land encompasses any large area completely covered by impervious surfaces such as asphalt, concrete or rooftop.

The proposed amendments are necessary to align the County Code and PFM with the new soil survey and the new soil problem classes. The amendments include a new County Soils Map and revisions to Chapter 107 (Problem Soils) of the County Code, and Chapters 4 (Geotechnical Guide lines), 6 (Storm Drainage), and 11 (Erosion and Sediment Control) of the PFM.

G. Summary of Proposed Amendments

New County Soils Map

The information from the updated soil survey was transferred to the County's GIS system. The soils mapping was then transferred from the soils layer in GIS onto the County's real property identification maps to create the new County Soils Map. These soils maps are available to the general public on the County's website through the Digital Map Viewer. A sample from the new County Soils Map is provided as Attachment A. A hard copy of the official County Soils Map to be adopted by the Board is on file with the Clerk to the Board.

Amendments to Chapter 107 (Problem Soils)

The proposed amendments to Chapter 107 (Problem Soils) do the following:

- Provide definitions of the new soil problem classes and a listing of the soils in those classes.
- Replace "soil report" with "geotechnical report" to be consistent with terminology in the Virginia Unified Statewide Building Code.
- Require that at least five (5) property owners be notified, if soil report notices are required for a proposed construction.
- Revise the definition of "Problem Soils" to align it with the new County Soils Map and the new soil problem classes.
- Provide a definition for "Marine clay" soil.

The proposed amendments to Chapter 107 (Problem Soils) are included as part of Attachment B.

Amendments to the Public Facilities Manual

The proposed amendments to the PFM incorporate information from the new soil survey either directly or by reference, requirements for geotechnical reports and plan submissions, and construction related requirements. The proposed amendments are in Attachment C.

The proposed amendments to Chapter 4 (Geotechnical Guidelines) include the following:

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- Clarify who may prepare geotechnical reports and when geotechnical reports are reviewed by the Geotechnical Review Board.
- Incorporate information from the new soil survey on soil mapping, soil problem classes and soil units.
- Define when geotechnical reports are required and what soils related design and construction issues need to be addressed in site, grading, subdivision and construction plans.
- Provide a definition for "Expansive Soils" consistent with the Virginia Uniform Statewide Building Code.
- Prohibit the use of expansive soils for structural fill for building pads, foundation backfill, backfill around structures, and retaining walls.

The proposed amendments to the PFM Chapter 6 (Storm Drainage) include the following:

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- Provide a reference to the new soil maps on the County's website.
- Clarify who may specify acceptable slopes for excavations.
- Delete Table 6.27 (General Rating for Dams, Embankments and Reservoirs) and provide a reference to the NRCS website for the descriptions, properties and technical data of the new soil survey.
- Delete references to Table 6.27

The proposed amendments to PFM Chapter 11 (Erosion and Sediment Control) include the following:

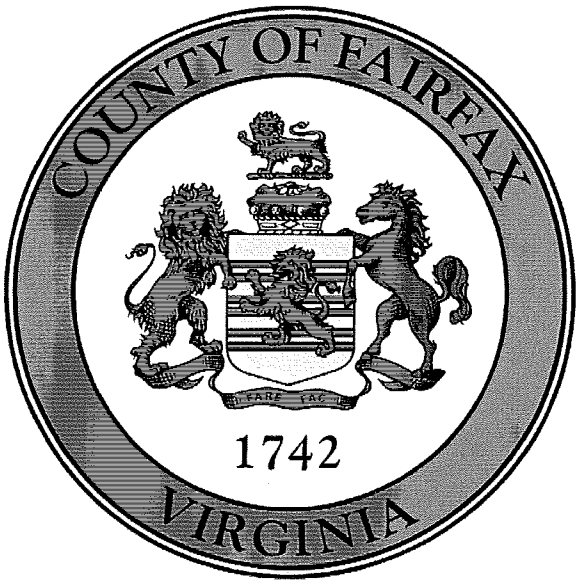
- Provide a reference to the new soil maps on the County's website and delete the references to the old soil survey.
- Revise Table 11.1 (Grade Class), and delete Table 11.2 (Erosion, Long Term, Symbols) to align with the new soil survey.
- Revise Table 11.3 (Numerical Index County Soils) to include names and indices of the new soil survey units, and delete the old soil survey unit names and indices.
- Delete Plates 3-11, and 3M-11 (General Soil), and provide new Plates 3-11 and 3M-11 (Soil Physiographic Provinces).
- Revise Plates 4-11 and 4M-11 to show the new soil survey symbols.
- Delete the plates summarizing the engineering test data of the old soil survey (6-11, 6M-11, 7-11, 7M-11, 8-11, 8M-11, 9-11, and 9M-11), and provide a link

to the NRCS website for the descriptions, properties and technical data of the new soil survey.

- Renumber Plates 10-11, 10M-11, 11-11, and 11M-11 as 6-11, 6M-11, 7-11, 7M-11, respectively.

H. Attached Documents:

Attachment A – Sample from the new County Soils Map
Attachment B – Amendments to Chapter 107 (Problem Soils) of the County Code
Attachment C – Amendments to PFM Chapter 4 (Geotechnical Guidelines), Chapter 6 (Storm Drainage), Chapter 11 (Erosion and Sediment Control), and Plates 3-11, 3M-11, 4-11, 4M-11, 6-11, 6M-11, 7-11, and 7M-11



Fairfax County, Virginia
Real Property Identification Maps
Soils

Soil Symbols

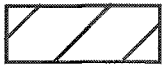
-SOIL NUMBER — GLENELG SILT LOAM 39B
-SLOPE — 2 TO 7 PERCENT.....39B.....B
SLOPE
0 –2 PERCENT.....A
2-7 PERCENT.....B
7-15 PERCENT.....C
15-25 PERCENT.....D
25-25 PERCENT.....E

Soil Lines

Soil survey maps are to be used for general planning purposes only. Please be aware that soil lines are not definitive. Soils gradually phase into one another and characteristics of neighboring soil types will be found within a soil's borders.

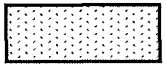
Marumsco Soils

Marumsco soils are mapped in complexes with other soil types. The complexes are highly variable and consist of combinations of clays, silts, sands and gravels. They may also be problematic. In steep areas that contain clays known as "marine clays," slope stability can be a problem. In addition, structures constructed on clays found in this complex could suffer foundation distress if adequate precautions are not taken during design and construction.



Previously Mapped Marine Clay

These areas wer mapped as marine clays in previous soil surveys. Marine clays are high shrink-swell soils that can cause foundation distress. They are sometimes referred to as Potomac Clays or Deltaic Clays.



Non-Marine Clay Shrink-Swell Soils

Soils containing other shrinking-swelling clays that can lead to foundation distress if precautions are not taken during design and construction.

Potential Asbestos Containing Soils

These soils are mapped over naturally asbestos-containing bedrock. Safety precautions must be taken during construction. Orange soils, which overlie a majority of this geology, also contain shrinking-swelling clays which can cause foundation distress.

Landfill

Quarry

Soil Types

1A	Albano silt loam
2B	Ashburn silt loam
3	Barkers Crossroads loam
4B	Barkers Crossroads-Nathalie complex
4C	Barkers Crossroads-Nathalie complex
4D	Barkers Crossroads-Nathalie complex
5B	Barkers Crossroads-Rhodhiss complex
5C	Barkers Crossroads-Rhodhiss complex
5D	Barkers Crossroads-Rhodhiss complex
5E	Barkers Crossroads-Rhodhiss complex
6B	Barkers Crossroads-Rhodhiss-Rock outcrop complex
6C	Barkers Crossroads-Rhodhiss-Rock outcrop complex
6D	Barkers Crossroads-Rhodhiss-Rock outcrop complex
6E	Barkers Crossroads-Rhodhiss-Rock outcrop complex
7B	Beltsville silt loam
8A	Bermudian silt loam
9B	Birdsboro loam
10A	Bowmansville silt loam
11B	Catlett gravelly silt loam
11C	Catlett gravelly silt loam
11D	Catlett gravelly silt loam
12	Chantilly loam
13A	Chantilly-Albano complex
14B	Chantilly-Ashburn complex
15A	Chantilly-Bermudian complex
16B	Chantilly-Birdsboro complex
17A	Chantilly-Bowmansville complex
18B	Chantilly-Catlett complex
18C	Chantilly-Catlett complex
18D	Chantilly-Catlett complex
19B	Chantilly-Clover complex
20B	Chantilly-Delanco complex
21A	Chantilly-Dulles complex
21B	Chantilly-Dulles complex
22B	Chantilly-Manassas complex
23B	Chantilly-Montalto complex
23C	Chantilly-Montalto complex
24D	Chantilly-Nestoria complex
24E	Chantilly-Nestoria complex
25B	Chantilly-Penn complex
25C	Chantilly-Penn complex
26A	Chantilly-Rowland complex
27B	Chantilly-Sycoline-Kelly complex
27C	Chantilly-Sycoline-Kelly complex
28B	Clover silt loam
29A	Codorus silt loam
30A	Codorus and Hatboro soils
31B	Danripple gravelly loam
31C	Danripple gravelly loam
32B	Delanco loam
33A	Downer loamy sand
34A	Dulles silt loam
34B	Dulles silt loam
35A	Elbert silt loam
36A	Elkton silt loam
37B	Elsinboro loam
38B	Fairfax loam
38C	Fairfax loam
38D	Fairfax loam
39B	Glenelg silt loam
39C	Glenelg silt loam
39D	Glenelg silt loam
39E	Glenelg silt loam
40	Grist Mill sandy loam
41A	Grist Mill-Downer complex
42A	Grist Mill-Elkton complex
43A	Grist Mill-Gunston complex
44A	Grist Mill-Honga complex
45A	Grist Mill-Matapeake complex
45B	Grist Mill-Matapeake complex
46A	Grist Mill-Mattapex complex
46B	Grist Mill-Mattapex complex
47B	Grist Mill-Woodstown complex
48A	Gunston silt loam
49A	Hatboro silt loam
50	Hattontown silt loam
51A	Hattontown-Elbert complex
52B	Hattontown-Haymarket complex
52C	Hattontown-Haymarket complex
53A	Hattontown-Jackland complex
54B	Hattontown-Jackland-Haymarket complex
54C	Hattontown-Jackland-Haymarket complex
55B	Hattontown-Kelly complex
56B	Hattontown-Orange complex
57C	Hattontown-Orange complex, very stony
59B	Haymarket silt loam
59C	Haymarket silt loam
60A	Honga peat
61A	Huntington silt loam
62A	Jackland silt loam
63B	Jackland and Haymarket soils
63C	Jackland and Haymarket soils
64B	Jackland and Haymarket soils, very stony
64C	Jackland and Haymarket soils, very stony
64D	Jackland and Haymarket soils, very stony
65B	Kelly silt loam
66	Kingstowne sandy clay loam
67B	Kingstowne-Beltsville complex
68B	Kingstowne-Danripple complex
68C	Kingstowne-Danripple complex
69B	Kingstowne-Elsinboro complex
70A	Kingstowne-Sassafras complex
70B	Kingstowne-Sassafras complex
70C	Kingstowne-Sassfrass complex
71C	Kingstowne-Sassafras-Marumsco complex
71D	Kingstowne-Sassafras-Marumsco complex
71E	Kingstowne-Sassafras-Marumsco complex
72B	Kingstowne-Sassafras-Neabsco complex
73A	Lindside silt loam
74B	Lunt-Marumsco complex
75B	Manassas silt loam
76A	Matapeake silt loam
76B	Matapeake silt loam
77A	Mattapex loam
77B	Mattapex loam
78B	Meadowville loam
79B	Nathalie gravelly loam
79C	Nathalie gravelly loam
79D	Nathalie gravelly loam
80D	Nestoria channery silt loam
80E	Nestoria channery silt loam
81B	Oatlands loam
81C	Oatlands loam
82B	Orange silt loam
83C	Orange silt loam, very stony
84B	Panorama loam
85B	Penn silt loam
85C	Penn silt loam
86	Pits, gravel
87C	Rhodhiss sandy loam
87D	Rhodhiss sandy loam
87E	Rhodhiss sandy loam
88C	Rhodhiss-Rock outcrop complex
88D	Rhodhiss-Rock outcrop complex
88E	Rhodhiss-Rock outcrop complex
89A	Rowland silt loam
90A	Sassafras sandy loam
90B	Sassafras sandy loam
90C	Sassafras sandy loam
91C	Sassafras-Marumsco complex
91D	Sassafras-Marumsco complex
91E	Sassafras-Marumsco complex
92B	Sassafras-Neabsco complex
93B	Sumerduck loam
94B	Sycoline-Kelly complex
94C	Sycoline-Kelly complex
95	Urban land
96	Urban land-Barker Crossroads complex
97	Urban land-Chantilly complex
98	Urban land-Grist Mill
99	Urban land-Hattontown complex
100	Urban land-Kingstowne complex
101	Urban land-Wheaton complex
102	Wheaton loam
103A	Wheaton-Codorus complex
104B	Wheaton-Fairfax complex
104C	Wheaton-Fairfax complex
104D	Wheaton-Fairfax complex
104E	Wheaton-Fairfax complex
105B	Wheaton-Glenelg complex
105C	Wheaton-Glenelg complex
105D	Wheaton-Glenelg complex
106A	Wheaton-Hatboro complex
107B	Wheaton-Meadowville complex
108B	Wheaton-Sumerduck complex
109B	Woodstown sandy loam

Real Property Identification Legend

BOUNDARIES

- TOWN
- CITY, COUNTY, AND STATE
- PROPERTY
- QUESTIONABLE PROPERTY
- HISTORIC PROPERTY
- SUBDIVISION
- SUBDIVISION BLOCK
- RIGHT OF WAY

EASEMENTS

- UTILITY
- STORM DRAINAGE
- INGRESS-EGRESS
- CONSERVATION
- APPROVED FLOOD PLAIN

DISTRICTS

- SPECIAL TAX DISTRICT
- AGRICULTURAL FORESTAL DISTRICT

TRANSPORTATION

- PUBLIC STREET
- UNCONSTRUCTED PUBLIC STREET
- OUTLET ROAD
- PAVEMENT OR PARKING LIMITS
- RAILWAY
- METRO RAILWAY

UNIQUE IDENTIFIERS

- SUBDIVISION NUMBER
- BLOCK NUMBER
- PARCEL OR LOT NUMBER

DRAINAGE

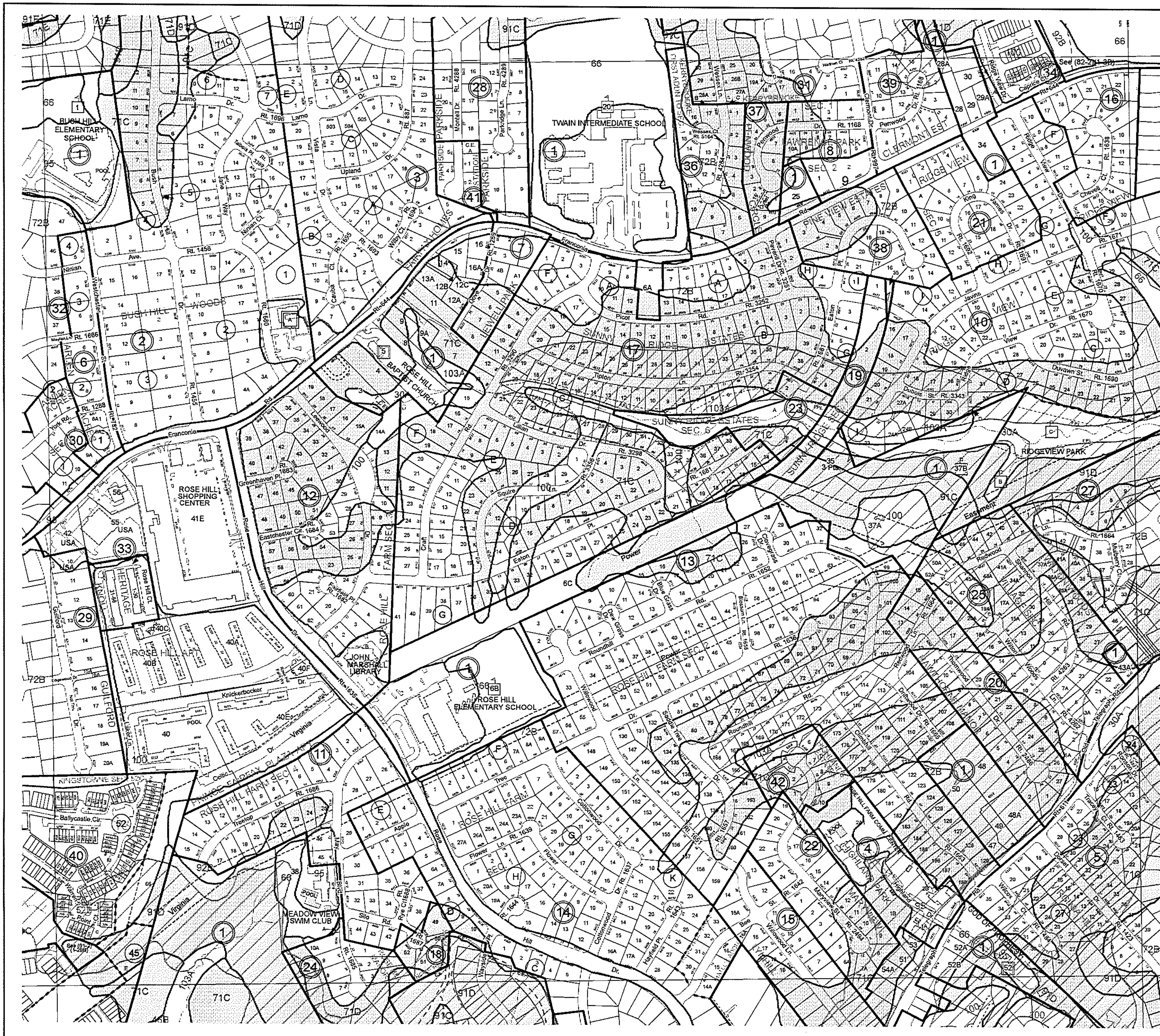
- STREAMS & CREEKS
- RIVERS, PONDS, AND LAKES
- DAMS

PARCEL ANNOTATIONS

- PARCEL NUMBER
- SPLIT PARCELS
- CONSOLIDATED LOTS
- ADDRESSES
- QUESTIONABLE PROPERT CUT

FEATURES & SYMBOLS

- BUILDINGS
- SCHOOLS
- FIREHOUSES
- PLACES OF WORSHIP
- CEMETERIES
- PARKLAND
- NATURE CONSERVANCY



County of Fairfax, Virginia, 1742

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National Geodetic Vertical Datum 1929

GENERAL NOTES

Soil Lines

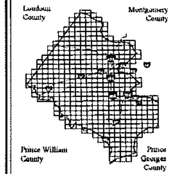
Marumsco Soils

Previously Mapped Marine Clay

Non-Marine Clay High Shrink-Swell Soils

Potential Asbestos Containing Soils

Landfill ⨯ Quarry



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SOILS MAP

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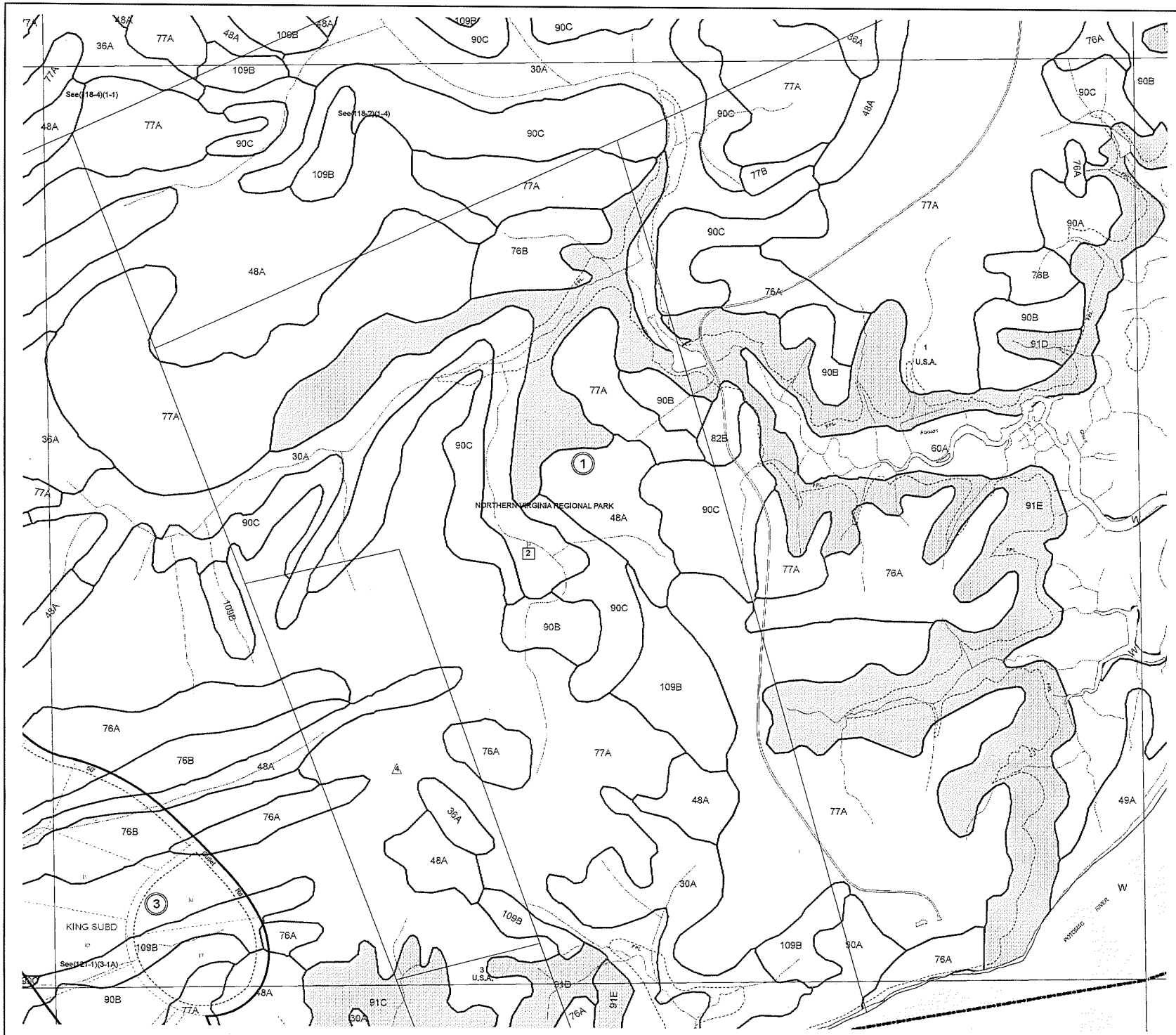
Revised to : 01 - 01 - 2011

Prepared by:

DEPARTMENT OF INFORMATION TECHNOLOGY
Enterprise Services Division
GIS and Mapping Services
12000 Government Center Parkway, Suite 117
Fairfax, Virginia 22035-0010
(703) 324-2712
FAX (703) 324-3937

For questions or comments about the content of this map please contact the Northern Virginia Soil and Water Conservation District
12055 Government Center Parkway, Suite 905
(703) 324-1460
FAX (703) 324-1421

Print Date 25 Jan 2011



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Map tile is 36" X 75" based on USGS 1:24,000 scale 7 1/2 minute Quad. Virginia Coordinate System values are of 1983 North Zone in U.S. feet based on NAD 83/93 High Precision GPS Network adjustment.

National Geodetic Vertical Datum 1929

GENERAL NOTES

Soil Lines

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Landfill **Quarry**

Loudoun County | Montgomery County | Prince William County | Prince George's County

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SHEET INDEX

SOILS MAP
121-2

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Prepared by:

DEPARTMENT OF INFORMATION TECHNOLOGY
Enterprise Services Division
GIS and Mapping Services
12000 Government Center Parkway, Suite 117
Fairfax, Virginia 22035-0010
(703) 324-2712
FAX (703) 324-3957

For questions or comments about the content of this map please contact the Northern Virginia Soil and Water Conservation District
12055 Government Center Parkway, Suite 905
(703) 324-1460
FAX (703) 324-1421

Print Date 25 Jan 2011

Proposed Amendment to Chapter 107 (Problem Soils)
of
The Code of the County of Fairfax, Virginia

Amend Chapter 107, where insertions are shown as underlines and deletions are shown as strikeouts, to read as follows:

CHAPTER 107.
Problem Soils.[1]

Article 1. General Provisions.

Article 2. Definitions.

Article 1. General Provisions.

Section 107-1-1. Unlawful to construct or grade in certain problem soil areas without compliance with applicable requirements of this Chapter, Subdivision Ordinance and Zoning Ordinance of this Code.

(a) It is hereby determined by the Board of Supervisors that grading and the construction of any building or structure on land containing problem soils is potentially injurious to the health, safety and welfare of the public and that no such construction or grading shall occur until adequate safeguards have been taken.

(b) It shall be unlawful for any person to grade, construct or to perform any foundation related work on any new building or structure or to add to the exterior dimensions of any existing building or structure on land containing problem soils without first complying with the applicable provisions of this Chapter, the Zoning Ordinance, the Subdivision Ordinance of this Code and any applicable Federal or State Regulations. (17-75-17; 1961 Code, §§ 7-2 and 7-3; §§ 15.2-2241-2246; 15-02-107.)

[1] For "Guidelines for the Preparation of Geotechnical Studies," refer to the Fairfax County *Public Facilities Manual.*

Section 107-1-2. Soil Classes.

Soil Class designations I, II, III, and IV are based on the severity of problems associated with these soils and the potential difficulty of analyzing and correcting those problems. Class I soils are undisturbed natural soils that typically have few characteristics that would adversely affect building foundations. Class II soils are undisturbed natural soils that typically have high groundwater or restrictive soil layers. Class III soils are undisturbed natural soils with characteristics such as high shrink/swell potential, compressibility, low bearing strength, and high water table, which may result in poor drainage, building settlement, and unstable slopes, etc. Class IV soils are soils that have been disturbed or altered as a result of grading or construction resulting in soils with variable characteristics. Class IV soils are divided into two groups, IVA and IVB. Class IVA soils are disturbed soils that were originally Class III soils, and Class IVB soils are disturbed soils that were originally Class I or Class II soils.

Section 107-1-~~2~~3. ~~Soil~~ Geotechnical report required.

(a) Unless otherwise stipulated in this Chapter, a ~~soil~~ geotechnical report prepared by, or under the direction of, a professional engineer experienced in soil and foundation engineering must be submitted for all construction and grading work located in problem soils areas ~~which are delineated on the official map adopted by the Board of Supervisors,~~ and for ~~such~~ other ~~construction and grading work~~ areas where special soil or water conditions are deemed by the Director to be potentially injurious and in instances where problem soils are discovered on the project site. If the Director determines that problem soils are not located adjacent to or within the construction area and that the proposed construction on a site with problem soils will not adversely impact either the subject property or adjoining properties, ~~the Director may exempt the project from the requirement of~~ a ~~soil~~ geotechnical report will not be required.

(b) The required ~~soil~~ geotechnical report and associated plans, specifications and other documentation must be prepared in accordance with the procedures outlined in the Public Facilities Manual adopted by the Board of Supervisors. When the Director deems that the proposed construction or grading located in a problem soil may adversely impact adjacent properties as a result of grading or construction methods including, but not limited to, blasting and dynamic compaction, the ~~soil~~ geotechnical report must be accompanied by written proof of notification of all owners of property abutting and immediately across the street from the subject property. If there are fewer than five (5) properties abutting and immediately across the street from the subject property, then notices shall be sent to other property owners in the immediate vicinity so that notices are sent to different owners of not fewer than five (5) properties. Notice shall be sent to the last known address of the owner(s) as shown in the current Real Estate Assessment files and shall be sent by certified mail, return receipt requested. ~~five (5) adjoining property owners or all adjoining property owners if there are less than five (5).~~ The form of such notice shall be approved by the Director.

(c) Submission of a ~~soil~~ geotechnical report shall not be required for additions, alterations or repairs to existing structures or proposed residential dwellings located in Class IVB soils on non-bonded lots meeting the conditions specified in the Public Facilities Manual unless the grading or construction work in combination with soil or water conditions are deemed by the Director to be potentially unsafe for the occupants of the structure or adjoining properties. In lieu of a ~~soil~~ geotechnical report, the Director may require a permit applicant to provide drawings and/or calculations showing that the soil problems have been addressed in accordance with the building codes. Any required drawings and calculations must be certified by a licensed professional engineer or architect and must be in compliance with the building codes.

Examples of conditions that may require submission of ~~soil~~ geotechnical reports for additions, alterations or repairs, include, but are not limited to the following:

1. Construction work involving deep excavations in close proximity to existing structures.
2. Construction work resulting in vibrations from the installation of piles, dynamic compaction, or blasting.
3. Construction work involving foundations in close proximity to retaining walls or steep slopes, or grading work in problem soils.
4. Major Additions.

Examples of conditions that do not typically require the submission of ~~soil~~ geotechnical reports for additions, alterations, or repairs include, but are not limited to the following:

1. At grade construction work not involving deep excavations.
2. At grade construction work not requiring piles, dynamic compaction, or blasting of rocks.
3. Minor Additions.

(d) Submission of a ~~soil~~ geotechnical report shall not be required as a prerequisite for any plat approval when no grading or construction work is proposed with the subject plat. The Director may require that the engineer or surveyor note on the plat that future grading or construction work in problem soil may require the submission of a ~~soil~~ geotechnical report. ~~For the subdivision of parcels of land where the soils on the site are unmapped on the County soils map, a soils map shall be required prior to approval of the associated construction plan.~~

(e) Submission of a ~~soil~~ geotechnical report shall not be required for the installation or repairs of linear structures in problem soils such as public utilities, sanitary sewer lines, storm sewer lines, trails, sidewalks, drainage channel improvements, telephone and cable TV lines, etc., when the associated work complies with the safety requirements of the Occupational Safety and Health Administration (OSHA) as adopted by the Commonwealth. (17-75-17; 1961 Code, § 7-4; 32-91-107; 15-02-107; 15-02-107.)

Section 107-1-~~3~~4. Referral to Geotechnical Review Board[2]; effect of recommendations.

[2] For " Geotechnical Review Board" refer to the Fairfax County *Public Facilities Manual*

After a ~~soil~~ geotechnical report on the proposed work has been submitted, the Director shall refer those projects~~, except those projects~~ that he determines ~~do not~~ pose ~~any~~ a serious threat of soil-related problems, to the Geotechnical Review Board for analysis and appropriate advice and recommendations. The recommendations of the Geotechnical Review Board shall not be binding on the Director. No work shall be commenced until after the proposed work has been approved. However, approval as to soil conditions shall not relieve any person from obtaining any or all additional permits and approvals necessary for the proposed work. (17-75-17; 1961 Code, § 7-4; 15-02-107.)

Section 107-1-4~~5~~5. Prerequisite for issuance of residential and non-residential use permits.

Residential and non-residential use permits shall be issued only after receipt and approval of the soil engineer's inspection report on earthwork, roadway and foundation construction. (17-75-17; 1961 Code, § 7-4; 15-02-107.)

Section 107-1-5~~6~~6. Waiver of ~~soil~~ geotechnical report.

The Director, or the Director's designee may waive any requirements of Section 107-1-~~2~~3 so long as the waiver is not contrary to any mandatory requirements of the County Code (17-75-17; 1961 Code, § 7-4; 15-02-107.)

Section 107-1-6~~7~~7. Responsibility of developers and builders.

(a) Review and approval of plans, specifications and reports by the County, with or without recommendations by the Geotechnical Review Board, shall in no way relieve a developer or builder of the responsibility for the design, construction and performance of the structures, pavement and slopes on the project and damage to surrounding properties.
(b) The warranty on the foundation of any new dwelling against structural defects shall be for a period no less than five years. (§ 55-70.1)
(c) Innovative construction methods or techniques are encouraged for solving soil-related problems. The Director may require special bonding in such form and amount as may be deemed necessary when such methods or techniques are approved for construction. (17-75-17; 1961 Code, § 7-4; 15-02-107.)

Section 107-1-7~~8~~8. Keeping of records; index of locations of ~~soil~~ geotechnical reports.

The Director shall keep on file all ~~soil~~ geotechnical reports which have been required to be submitted and an index of the location of said ~~soil~~ geotechnical reports for the benefit of the public. (17-75-17; 1961 Code, § 7-4; 15-02-107.)

ARTICLE 2. Definitions.

Section 107-2-1. Definitions.

(a) Director means the Director of the Department of Public Works and Environmental Services or designated agent.
(b) Class I soils consist of Soil Nos. 11, 28, 33, 38, 39, 76, 79, 80, 81, 84, 85, 87, 88, and 90.
(c) Class II soils consist of Soil Nos. 2, 7, 9, 31, 75, 77, 78, 92, and 93.
(d) Class III soils consist of Soil Nos. 1, 8, 10, 29, 30, 32, 34, 35, 36, 37, 48, 49, 59, 60, 61, 62, 63, 64, 65, 74, 82, 83, 89, 91, and 94.
(e) Class IVA soils consist of Soil Nos. 13, 15, 17, 20, 21, 26, 27, 42, 43, 44, 47, 51, 52, 53, 54, 55, 56, 57, 69, 71, 73, 86, 103, 106, and 109.
(f) Class IVB soils consist of Soil Nos. 3, 4, 5, 6, 12, 14, 16, 18, 19, 22, 23, 24, 25, 40, 41, 45, 46, 50, 66, 67, 68, 70, 72, 95, 96, 97, 98, 99, 100, 101, 102, 104, 105, 107, and 108.
(g) Geotechnical Report shall mean a geotechnical or foundation engineering study prepared in accordance with the design and construction criteria outlined in the Public Facilities Manual.
(~~b~~h) Major Addition is considered any addition or alteration to an existing residential structure of equal to or greater than 500 square feet in exterior footprint area, or equal to or greater than fifty (50) percent of the exterior footprint area of an existing non-residential structure, when such addition entails grading or construction of foundations in problem soils.
(~~c~~i) Minor Addition is considered any addition or alteration to an existing structure of less than 500 square feet in exterior footprint area for residential structures, or less than fifty (50) percent of the exterior footprint area of an existing non-residential structure, when such addition entails grading or construction of foundations in problem soils.
(~~d~~j) Problem Soils shall mean ~~"marine clays" and other associated~~ landslide susceptible soils, shrinking and swelling soils~~clays~~, soils with high water table conditions, soils containing hazardous material, buried waste sites, uncompacted and~~/or~~ undocumented man-placed fills, and earthen structures that would require special precautions for safety during and after construction activity. Problem soils include areas of Marumsco soils, “marine clays”, Class III soils, and Class IV soils, as shown and/or identified on the official map adopted by the Board of Supervisors or any other soil as determined by the Director of the Department of Public Works and Environmental Services.
(k) “Marine clay” is a term used locally for clay-rich sediments of the Cretaceous-Age Potomac Formation of the Atlantic Coastal Plain. The Potomac Formation, identified as unit Kp on USGS geologic maps, thickens from a few feet along the boundary with the Piedmont Province in the west to over one hundred feet along the eastern boundary of

Fairfax County. As a result of removal of younger deposits that have since eroded away, the sediments are commonly over-consolidated. The “marine clay” sediments consist mostly of montmorillonite minerals (which results in a high potential for shrink and swell with variations in moisture) that are commonly classified as elastic SILT (MH) and fat CLAY (CH) by the Unified Soil Classification System. Due to physical and chemical weathering, “marine clay” in the uppermost 20 ft of the Potomac Formation are preferentially weakened along fractures, joints and parting planes, and can cause landslides many years after the slopes are created. Sand layers, often water-bearing, are frequently mixed with the “marine clay” layers. The clays and silts are subject to large changes in volume with soil moisture changes. Regulations in the Fairfax County Zoning Ordinance, regarding “Marine Clay” are only applicable to the areas mapped as "Previously Mapped Marine Clay."

(l) Soil Number shall mean the identifying number assigned to a soil unit in the Soil Survey of Fairfax County prepared by the United States Department of Agriculture National Resource Conservation Service.

~~(e) Soil Report shall mean a geotechnical or foundation engineering study prepared in accordance with the design and construction criteria outlined in the Public Facilities Manual. (15-02-107.)~~

Proposed Amendment to Chapter 4 (Geotechnical Guidelines)
of
The Public Facilities Manual

Amend Chapter 4, where insertions are shown as underlines and deletions are shown as strikeouts, to read as follows:

4-0000 GEOTECHNICAL GUIDELINES – TABLE OF CONTENTS

4-0000 GEOTECHNICAL GUIDELINES

4-0100 PROCEDURES

4-0101 General Policy[1] ~~General Policy (See also § 11-0408 et seq.)~~

4-0101.1 The purpose of these guidelines for the preparation of geotechnical ~~studies~~ reports is to outline minimum recommended procedures for planning, organizing and conducting subsurface exploration, sampling, testing and engineering analysis in conjunction with ~~subsurface~~ geotechnical studies. The guidelines are not to be considered as rigid. The planning of exploration, sampling and testing programs, and close supervision of the work shall be vested in a competent geotechnical engineer who has experience in this type of work and who is licensed by the State. Geotechnical reports must be prepared by, or under the direction of, a professional authorized by the State to perform such work.

4-0101.2 ~~For problem soils, a GRB~~ The Geotechnical Review Board (GRB) has been established to review ~~soils~~geotechnical reports and associated plans referred to it by the Director and~~. The GRB is required~~ to provide recommendations to the Director on the sufficiency of the investigations, analyses, and proposed designs and construction techniques. The GRB will review all geotechnical reports and associated plans for projects located in areas of problem soils that the Director determines pose a serious threat of soil-related problems.

4-0102 Scope

4-0102.1 Experience has shown that ~~in certain areas of the County~~ there are potential problems associated with certain types of soils including ground slippage and instability of Cretaceous Age deltaic clays, ~~often called~~ identified as Marumsco soils and/or "marine clays," shrinking and swelling of certain clays, ~~and high water table conditions.~~ soils with shallow water tables, soils containing hazardous material, buried waste sites, uncompacted and/or undocumented fills, and/or earthen structures that would require special precautions for safety during and after construction activity. The extent of such soils has been approximately delineated on the County soils maps which have been adopted by the Board. Problem Soils are defined in Chapter 107 (Problem Soils) of the County Code. Any grading and/or construction of any building or structure, modification to add to the exterior dimensions of any existing building or structure, or any foundation related work on land containing problem soils must comply with the applicable provisions of Chapters 107 (Problem Soils), 112 (Zoning Ordinance), and 101 (Subdivision Ordinance) of the County Code and any applicable Federal or State Regulations.

4-0102.2 There are implied warranties for the foundation of new dwellings in accordance with Virginia Code § 55-70.1.

~~4-0102.2 The guidelines are not to be considered as rigid. The planning of exploration, sampling and testing programs and close supervision of the work shall be vested in a competent geotechnical engineer and/or engineering geologist who has experience in this type of work and who is licensed to practice engineering in Virginia.~~

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[1] See also §§ 6-1605, 6-1606, 6-1607, and 11-0408 et seq.

4-102.3 The geotechnical report is generally prepared in support of an associated site or grading plan. The submission requirements for geotechnical report outlined in this section is in relation to the associated site or grading plan for the proposed project, as required per Chapter 107 (Problem Soils) of the Code. Other agencies may have geotechnical report requirements based on the Virginia Uniform Statewide Building Code (USBC).

4-0200 SOILS

4-0201 County Soil Units, Map and Classes

4-0201.1 The comprehensive source of information about soils in the County is the Soil Survey of Fairfax County, prepared by the United States Department of Agriculture Natural Resources Conservation Service (NRCS), publicly released in January 2008. This survey describes one hundred-eight (108) soil units, numbered one (1) through fifty-seven (57), and fifty-nine (59) through one hundred-nine (109). Names for the soil units were formulated using the NRCS's Soil Taxonomy, 2nd Ed. The soil survey was used to create the County soils map which depicts the soil unit boundaries and includes overlays of Marumsco soils, "marine clays," non-marine clay high shrink-swell soils, and asbestos containing soils.

4-0201.2 Based on the severity of problems associated with these soils and the potential difficulty of analyzing and correcting those problems, the one hundred-eight (108) units of soils are grouped into four (4) classes (I, II, III, and IV). The designations serve as a guide to determine if and what type of geotechnical engineering study is required for proposed construction.

4-0201.3 As defined in Chapter 107 of the Code, Problem Soils include landslide susceptible soils, shrinking and swelling soils, soils with shallow water tables, soils containing hazardous material, buried waste sites, uncompacted and undocumented man-placed fills, and earthen structures that would require special precautions for safety during and after construction activity. Problem soils include areas of Marumsco soils, "marine clays", Class III, and Class IV soils, as shown and/or identified on the official map adopted by the Board of Supervisors or any other soil as determined by the Director of the Department of Public Works and Environmental Services.

4-0201.4 "Marine clay" is a term used locally for clay-rich sediments of the Cretaceous-Age Potomac Formation of the Atlantic Coastal Plain. The Potomac Formation, identified as unit Kp on USGS geologic maps, thickens from a few feet along the boundary with the Piedmont Province in the west to over one hundred feet along the eastern boundary of Fairfax County. As a result of removal of younger deposits that have since eroded away, the sediments are commonly over-consolidated. The "marine clay" sediments consist mostly of montmorillonite minerals (which results in a high potential for shrink and swell with variations in moisture) that are commonly classified as elastic SILT (MH) and fat CLAY (CH) by the Unified Soil Classification System. Due to physical and chemical weathering, "marine clay" in the uppermost 20 ft of the Potomac Formation are preferentially weakened along fractures, joints and parting planes, and can cause landslides many years after the slopes are created. Sand layers, often water-bearing, are frequently mixed with the "marine clay" layers. The clays and silt are subject to large changes in volume with soil moisture changes.

4-0201.5 Areas containing “marine clay” soils were mapped by the County Soil Science Office[2] and designated as such on prior County soil maps. The more recent soil mapping by NRCS, which utilizes national standards for soil unit names and descriptions, does not include a specific soil unit for “marine clay”. Areas mapped as containing “marine clay” soils in earlier survey work are identified as "Previously Mapped Marine Clay" and are overlaid on the NRCS mapping. Undisturbed soils within the "Previously Mapped Marine Clay" overlay are mostly Marumsco soils, but in some locations other soil units occur. In those locations within the “Previously Mapped Marine Clay” overlay where the soils are mapped as something other than Class III soils, the requirements outlined in Section 4-0205.2.2 for Class IVA soil shall be met, regardless of the classification based on the recent NRCS soil map. Regulations in the Fairfax County Zoning Ordinance, regarding “Marine Clay” are only applicable to the areas mapped as "Previously Mapped Marine Clay."

4-0202 Class I Soils

4-0202.1 Class I soils are undisturbed natural soils that typically have few characteristics that would adversely affect building foundations or surrounding land. Class I soils consist of Soil Nos. 11, 28, 33, 38, 39, 76, 79, 80, 81, 84, 85, 87, 88, and 90. A geotechnical investigation is advised but not required as a condition of site or grading plan approval.

4-0202.2 The submission of a geotechnical report is typically not required under the following circumstances:

a) The building footprint is more than 25 feet from any Class III or IV problem soil. The 25-foot margin allows for errors in soil mapping. If the building footprint is within 25 feet, a report is required unless waived by the Director.
b) All proposed construction is in Class I and Class II soils and there is no grading activity in problem soils. If the proposed construction is partially located in a problem soil, especially Class III or IV soils, submission of a geotechnical report is required unless waived by the Director.
c) There are no buildings with more than three stories, mat foundations, deep foundations, deep excavations, sheeting and shoring, or retaining walls over 6 feet high. On a case by case basis, any report that is prepared may be submitted with the building plans after site or grading plan approval.

4-0202.3 For site, grading, subdivision or construction plans, the following items must be addressed in the plan:

a) Foundation drain details for proposed walls below-grade
b)Yard or overlot drainage
c) Construction notes for fill placement (acceptable material, lift thickness, density testing, frequency of testing, construction inspection notes as shown in §§ 4-0502.1 and 4-0502.2)
d) Excavation Safety
e) Impact on adjoining property

[2] The County Soil Science Office closed in 1996.

4-0203 Class II Soils

4-0203.1 Class II soils are undisturbed natural soils that typically have shallow water tables or restrictive soil layers. Class II soils consist of Soil Nos. 2, 7, 9, 31, 75, 77, 78, 92, and 93. A geotechnical investigation is strongly advised but not required as a condition of site or grading plan approval.

4-0203.2 The submission of a geotechnical report is typically not required under the following circumstances:

a) The building footprint is more than 25 feet from any Class III or IV problem soil. The 25-foot margin allows for errors in soil mapping. If the building footprint is within 25 feet, a report is required unless waived by the Director.
b) All proposed construction is within Class I and Class II soils and there is no grading activity in any problem soils. If the proposed construction is partially located in a problem soil, especially Class III or IV soils, submission of a geotechnical report is required unless waived by the Director.
c) There are no buildings with more than three stories, mat foundations, deep foundations, deep excavations, sheeting and shoring, or retaining walls over 6 feet high. On a case by case basis, any report that is prepared may be submitted with the building plans after site or grading plan approval.

4-0203.3 For site, grading, subdivision or construction plans, the following items must be addressed in the plan:

a) Groundwater problems are addressed with appropriate foundation drains and backfill on proposed walls below-grade
b) Yard or overlot drainage
c) Construction notes for fill placement (acceptable material, lift thickness, density testing, frequency of testing, construction inspection notes as shown in §§ 4-0502.1 and 4-0502.2)
d) Excavation Safety
e) Impact on adjoining property

4-0204 Class III Soils

4-0204.1 Class III soils are undisturbed natural soils that have characteristics such as high shrink/swell potential, high compressibility, low bearing strength, and shallow water tables, which may result in poor drainage, building settlement, and unstable slopes, etc. Class III soils consist of Soil Nos. 1, 8, 10, 29, 30, 32, 34, 35, 36, 37, 48, 49, 59, 60, 61, 62, 63, 64, 65, 74, 82, 83, 89, 91, 94, and 109. The soil types or conditions included in this group are: 1) Cretaceous-age Potomac Group Clays (mapped as Marumsco soils and/or “marine clay”); 2) Other soils containing high shrink-swell clays; 3) Soils with a seasonal high water table at or near the surface for prolonged periods and low bearing strength (poor foundation support); and 4) Alluvial or floodplain soils. A detailed geotechnical investigation and report are required.

4-0204.2 Geotechnical problems must be addressed with adequate engineering evaluations and designs prior to development. A geotechnical report, prepared according to the geotechnical guidelines in this chapter and the Virginia Uniform Statewide Building Code (USBC) is mandatory for all construction and grading within these problem soil areas. The engineering evaluation and report shall be submitted for approval, and the recommendations incorporated into the grading plans as requirements prior to plan approval. Construction inspections and certifications are required from the Engineer-of-Record.

4-0205 Class IV Soils

4-0205.1 Class IV soils are soils that have been disturbed or altered as a result of grading or construction resulting in soils with variable characteristics. Class IV soils are divided into two groups, IVA and IVB.

4-0205.2 Class IVA Soils

4-0205.2.1 Class IVA soils are disturbed soils that were originally Class III soils, and consist of Soil Nos. 13, 15, 17, 20, 21, 26, 27, 42, 43, 44, 47, 51, 52, 53, 54, 55, 56, 57, 69, 71, 73, 86, 103, and 106. Landfill and quarry areas are also grouped here. A detailed geotechnical investigation and report are required.

4-0205.2.2 Geotechnical problems must be addressed with adequate engineering evaluations and designs prior to development. A geotechnical report, prepared according to the geotechnical guidelines in this chapter and the Virginia Uniform Statewide Building Code (USBC) is mandatory for all construction and grading within these problem soil areas. The engineering evaluation and report shall be submitted for approval, and the recommendations incorporated into the grading plans as requirements prior to plan approval. Construction inspections and certifications are required from the Engineer-of-Record.

4-0205.3 Class IVB Soils

4-0205.3.1 Class IVB soils are disturbed soils that were originally Class I or II soils, and consist of Soil Nos. 3, 4, 5, 6, 12, 14, 16, 18, 19, 22, 23, 24, 25, 40, 41, 45, 46, 50, 66, 67, 68, 70, 72, 95, 96, 97, 98, 99, 100, 101, 102, 104, 105, 107, and 108.

4-0205.3.2 A limited geotechnical investigation is required in the form of a letter report to be incorporated into the first submission of the site, subdivision, grading or construction plans. The information placed on the plans will consist of soil strength tests e.g. SPT boring logs and construction notes addressing identified problems and other requirements for construction such as those identified under CLASS II soils (§ 4-0203.3). For example, the letter report should be based on knowledge of the previous site disturbance, proposed construction, site grades, floor elevations, etc. Borings shall extend through any fill to depths below the proposed footing elevation. Standard engineering practice is a depth that is two to three times the width of the proposed footing. Depending on the issues identified during the review of the plan, (i.e. depth of existing fill, proposed construction, recommended foundation and slab support, stability of slopes, the need for referral to the Geotechnical Review Board), a detailed geotechnical report

submitted separately may be required prior to the second submission of the site or grading plans. It is therefore advised that a comprehensive geotechnical report be obtained for these soils earlier in the process.

4-0205.3.3 For non-bonded lot grading plans, where proposed residential dwellings are to be located on properties containing Class IVB soils, a geotechnical investigation and report will not be required if a certification is provided stating that all eight of the items below are met. The certification must be signed and sealed by a professional authorized by the State to provide such information and incorporated into the plans. The eight items are listed below:

1. Class III or Class IVA soils are not mapped by NRCS on the property.
2. Project does not require sheeting and shoring, retaining walls over 6 feet high, pile foundations, geopiers, mat foundation, or ground modification; such as dynamic compaction, stone columns, vibra compaction, chemical stabilization, etc.
3. Geotechnical reports are not required under any other county regulation or building codes.
4. Maximum depth of existing disturbed land on the property is less than 5 feet.
5. Footings and floor slabs will be supported on competent natural soils.
6. Existing slopes on the property are not steeper than 3:1(horizontal:vertical). If existing slopes are steeper than 3:1(horizontal:vertical), the County's geotechnical review engineer shall be contacted. Evaluation of the slopes may be required, depending on the proposed house location.
7. Structure is located at least 15 feet from the top of any 3:1(horizontal:vertical) or steeper slope and the influence zone of house footings does not intercept with any slope. The influence zone of a footing is defined as the area beneath a 45-degree line extending outward and downward from footing exterior edge.
8. Foundation drain details are included on the plans.

4-0206 Geotechnical Report Requirements Summary

4-0206.1 The geotechnical report requirements are summarized in Table 4.1 below:

Table 4.1 Geotechnical Report Requirements Summary

ITEM	SOIL CLASS				
	I	II	III	IV	
				A	B
Geotechnical Investigation	1	2	REQ	REQ	REQ
Geotechnical Report	NRQ	NRQ	REQ	REQ	3
Geotechnical Specification on Plans[4]	REQ	REQ	REQ	REQ	REQ

Footnotes:

1. Advised but not required.

2. Strongly advised, but not required.
3. Results of geotechnical investigation are required on the first submission of plans. For non-bonded lot grading plans, where the proposed residential dwellings are to be located on properties containing Class IVB soils, the certification referenced in § 4-0205.2.3 shall be incorporated into plans.
4. For Class I soils see § 4-0202.3, and for Class II soils see § 4-0203.3. For Class III, and Class IV soils, report recommendations must be stated as requirements in specifications.

NRQ=Not Required REQ=Required

4-0206.2 The installation of linear structures such as storm sewer or sanitary sewer lines, usually do not require submission of a geotechnical report. Notes addressing placement of backfill and OSHA excavation requirements are sufficient in most cases. The only exception would be in cases where such construction activity might trigger movement in adjoining slopes. Cutting of existing steep slopes in slide prone areas (Marumsco or "Marine Clay" areas) requires slope stability analysis and submission of geotechnical report prior to plan approval or permit issuance. Additions to residential structures and minor commercial buildings exempt from site or grading plan submission requirements, only require an engineered foundation design submitted with building permit application.

4-~~0200~~ 0300 ~~SOILS~~ GEOTECHNICAL REPORT

4-~~0201~~ 0301 General Requirements and Procedures

4-~~0201.1~~ 0301.1 At the preliminary and pre-site plan stages, notations may be made during review that compliance with the Subdivision Ordinance, Zoning Ordinance, and Chapter 107 (Problem Soils) of the Code will be required for proposed plans~~.in problem soils areas.~~

4-~~0201.2~~ 0301.2 For subdivisions and site plans in these difficult areas, a ~~soils~~geotechnical report conforming to these guidelines must be submitted with the construction plans, and the construction plans must incorporate the recommendations of the ~~soils report~~geotechnical report as requirements. A ~~soils~~geotechnical report submission fee must be paid upon initial submission of the ~~soils~~geotechnical report.

4-~~0201.2A~~ 0301.2.A It shall be determined during staff review whether or not the project must be referred to the GRB.

4-~~0201.2B~~ 0301.2.B If a determination is made for referral, then 3 additional copies of the ~~soils~~geotechnical report and the construction plans shall be required.

4-~~0201.2C~~ 0301.2.C When these additional copies are received, the ~~soils~~geotechnical report and the construction plans shall be forwarded to the members of the GRB for their recommendations.

4-~~0201.2D~~ 0301.2.D The GRB shall review construction plans only in conjunction with the ~~soils~~geotechnical report.

4-0301.3 If the Director determines that proposed construction on a site with problem soils will not adversely impact either the subject property or adjoining properties, the Director may waive

the project from the requirement of a geotechnical report in accordance with Chapter 107 of the Code.

4-~~0202~~ 0302 Purpose of Geotechnical Investigation

4-~~0201.1~~ 0302.1 The purpose of any geotechnical investigation is to determine the character and physical properties of soil deposits for use as structure foundation or material for earthwork construction purposes. The type of structure to be built and anticipated geologic and field conditions have a major bearing on the type of investigation to be conducted.

4-~~0202.2~~ 0302.2 The investigation must, therefore, be planned with a knowledge of intended project size, land utilization and a broad knowledge of the geologic history of the area. Advice on geological features should be obtained from an experienced engineering geologist as required.

~~4-0203~~ 0303 General Guidelines. The site and soil exploration should include, but not be limited to, the following detailed factual information, analysis and recommendations:

4-~~0203.1~~ 0303.1 Surface Features. Surface contours include, but are not limited to, old construction, rock outcrops, water courses, ditches, ponds, wooded areas, and filled-in areas. Particular emphasis must be given to identification of possible old slide areas. This should include a thorough surface reconnaissance of both the site being developed and surrounding area. Consideration should also be given to re-viewing aerial photographs of the area.

4-~~0203.2~~ 0303.2 Hydrologic Features. The presence of seepage zones, depth to groundwater and the possible fluctuations with the seasons should be investigated.

4-~~0203.3~~ 0303.3 Subsurface Features

4-~~0203.3A~~ 0303.3.A A plotted record of the stratification of the soil deposits, both horizontal and vertical, shall be included in the ~~soils~~geotechnical report. This record should indicate, in the soil profile, the surface elevation of all borings and test pits, and should also indicate the thickness and character of the soils encountered. The profiles should reach to such a depth as may be required, and are to include 24 hr water level readings.

4-~~0203.3B~~ 0303.3.B Information on the degree of compactness of granular soils and on the consistency of cohesive soils should be provided.

4-~~0203.4~~ 0303.4 Exploration Methods. Field explorations should follow the applicable standards and recognized procedures of geotechnical engineering as set forth by ASTM, ASCE, AASHTO, ~~AEC,~~ etc.

4-~~0203.4A~~ 0303.4.A The interval of soil sampling shall be determined on the basis of soils encountered, the type of structure and other conditions. Continuous sampling may be required. Test procedures utilized shall be identified.

4-~~0203.4B~~ 0303.4.B The spacing and depth of borings must be based on the site conditions and the proposed construction.

4-~~0203.4C~~ 0303.4.C Borings shall extend sufficiently into an underlying material of adequate bearing capacity and below the depth of a possible slope failure. The bore holes must be plugged after completion of the borings and obtaining 24 hr water level readings.

4-~~0203.4D~~ 0303.4.D All the information and data obtained from the explorations must be recorded properly in the ~~soils~~geotechnical report.

4-~~0203.5~~ 0303.5 Groundwater Measurements. Information on groundwater elevations must be provided, including depth of permanent and perched water tables.

4-~~0203.5A~~ 0303.5.A Water tables should be determined after completing the boring and a minimum of 24 hrs later.

4-~~0203.5B~~ 0303.5.B Perforated casings or piezometers may be required in selected bore holes satisfactory to the Director to obtain long-term water level readings.

4-~~0203.6~~ 0303.6 Classification and Description. Direct observation of soil samples from various depths and locations shall be required for correlation with the known geology of the area. Classification and description of soils shall be done by the USCS (ASTM Specification D2487), and by the Visual Manual Identification Procedure (ASTM D2488). All terms and nomenclatures used for textural description of the soils must be clearly defined. Complete soil descriptions must also include in-place conditions, geologic names, local names and any other information that is pertinent to the interpretation of the subsoil characteristics.

4-~~0203.7~~ 0303.7 Laboratory Testing. The nature and ex-tent of laboratory testing deemed necessary is dependent upon the characteristics of the soil and the anticipated geotechnical problems requiring analysis.

4-~~0203.7A~~ 0303.7.A On granular soils, gradation tests on representative samples and water content determinations often are adequate.

4-~~0203.7B~~ 0303.7.B Testing of cohesive soils samples may include, but are not limited to, determination of water content, dry density and unconfined compressive strength.

4-~~0203.7C~~ 0303.7.C In stiff, fissured clays such as the Cretaceous Marumsco and/or "marine clays", the results of unconfined compression tests alone cannot be used to assess the structural property of the soil in-situ. Atterberg limit and hydrometer analysis tests aid in classification and also in predicting certain properties.

4-~~0203.7D~~ 0303.7.D Consolidation tests should be performed on samples from relatively soft soils which may underlie the foundations. Expansive pressure of the clays should also be determined for foundation design.

4-~~0203.7E~~ 0303.7.E For the deltaic clays which have undergone relatively large strains in the past, the important properties for predicting long-term behavior are the residual effective friction angle and the residual cohesion intercept (the absolute minimum strength of clay material).

These parameters should be determined by appropriate laboratory tests (drained direct shear tests using sufficient stress reversals to obtain large strains as discussed in the COE laboratory testing procedure EM 1110-2-1906). Many reversals are required to reach residual strengths. Some references suggest using a pre-split sample (Ref. Engineering Properties of Clay Shales Report No. 1, by W. Haley and B. N. MacIver). For less complex situations subject to approval of the Director, the required parameters may be estimated by comparison of other index properties (particularly the Atterberg limits) with those of similar soils for which test results are reported in the published literature and on the basis of past experience. Documentation shall be furnished when shear strength parameters are based on results other than laboratory tests. Such documentation must set forth the reasoning by which parameters were determined.

4-~~0203.8~~ 0303.8 Engineering Analysis and Recommendations

4-~~0203.8A~~ 0303.8.A The report of the soil studies shall include sufficient analytical foundation and slope stability studies to allow a reviewer to follow the logic and assumptions on which the analysis was based and conclusions reached. Recommendations and advice concerning pavement design, foundation design, earthwork, site grading, drainage, slope stabilization and construction procedures must be included in the report. The report shall include a complete record of the field and laboratory findings, information concerning structures to be built (types and elevations of basements), the conclusions reached from the study and the recommendations for use by the designer and the owner. Probable total and differential settlement of foundations, special basement problems and retaining wall design must be discussed and recommendations set forth.

4-~~0203.8B~~ 0303.8.B Where Marumsco soils and/or "marine clays" are found, an engineering analysis of the short and long-term stability of existing and planned slopes must be made including a careful evaluation of potential adverse effects on nearby properties. The stability analysis shall be made by acceptable methods of analysis. The long-term stability of Marumsco soils and/or "marine clays" ~~stability~~ shall be based on the "residual" shear strength parameters for the Marumsco soils and/or "marine clays".

4-~~0203.8C~~ 0303.8.C In areas that are susceptible to high water table (permanent, perched and/or seasonal) the engineer shall provide pavement design, and measures to assure dry basements and to preclude wet yards, etc.

4-~~0203.8D~~ 0303.8.D Design criteria for retaining walls or structures shall be given.

4-~~0203.8E~~ 0303.8.E The report shall include a discussion on the problems of expansive soils. Clay soils containing montmorillonite have been found in a wide variety of locations in southern Fairfax County and could exist in the areas of problem soils. It is suggested that the design recommendations be based on expansive properties of the clay unless it is shown other-wise by X-ray defraction studies or other appropriate laboratory tests.

4-~~0300~~ 0400 CONSTRUCTION PLANS

4-~~0301~~ 0401 General Information

4-~~0301.1~~ 0401.1 The recommendations in the ~~soils~~geotechnical report shall be incorporated into the plans as requirements to be performed during construction.

4-~~0301.2~~ 0401.2 The soils engineer must review the final construction plans and state his opinion as to whether or not the plans have been prepared in accordance with his recommendations, and note deviations from his recommendations.

4-~~0302~~ 0402 Footing and Drainage Design

4-~~0302.1~~ 0402.1 Where Cretaceous Age deltaic clays occur, roof drains shall be required and the downspouts from these drains shall be piped to a storm drainage system. However, the requirement may be waived or modified by the Director where soil conditions warrant.

4-~~0302.2~~ 0402.2 Foundation footings of structures must be placed at depths that will minimize differential settlement due to desiccation of underlying clays. The emplacement depth shall be based on the soil characteristics of the site. Consideration must be given to stratification of underlying materials, natural moisture content, gradation of backfill soils, site grading and adjacent vegetation. Consideration should also be given to special cases of potential volume change of clays underlying footings embedded in thin layers of natural or artificially compacted granular soils. Foundations in Marumsco and/or "marine clays" should be at least 4' (1.2m) deep. Where the geotechnical study has proven the 4' (1.2m) to be insufficient, the proper depth must be recommended. Foundations in areas of expansive clays developed in residual soils can usually be emplaced on firm underlying weathered rock materials.

4-~~0302.3~~ 0402.3 Surface and subsurface drainage shall be planned to minimize the amount of water entering the Marumsco soils and/or "marine clays"~~ soils~~.

4-~~0302.4~~ 0402.4 Perimeter drains shall be provided around all basement areas.

4-~~0400~~ 0500 CONSTRUCTION TECHNIQUES

4-~~0400~~ 0501 Sheeting, Shoring and Filling

4-~~0401.1~~ 0501.1 Sheeting and shoring or other approved methods for trench bracing may be required with the construction of underdrain or utility trenches and foundations.

4-~~0401.2~~ 0501.2 Engineered fill and backfill around structures shall be placed with approved select materials and uniform compaction throughout must be provided in 6" to 8" (150mm to 200mm) layers. Each layer of engineered fill shall be compacted at optimum moisture, plus or minus 2%, to a density of not less than 95% in accordance with AASHTO T-99 or ASTM D-698. ~~"Marine clays" shall not be permitted as backfill around structures or behind retaining walls.~~

4-0501.3 Expansive Soils, such as Marumsco and/or "marine clays" are not permitted as structural fill for building pads, foundation backfill, backfill around structures, or behind retaining walls. Expansive Soil is defined by the International Building Code and International Residential Code as:

"Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:
1. Plasticity Index (PI) of 15 or greater, determined in accordance with ASTM D 4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75 µm), determined in accordance with ASTM D 422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
4. Expansion Index greater than 20, determined in accordance with ASTM D 4829."

If the PI of the soil is 20 or less (e.g. PI $\leq$ 20) and the LL is 45 or less (e.g. LL $\leq$ 45), the Plasticity Index Corrected (PI_{cor}) or the Expansion Index Corrected (EI_{cor}) may be substituted in the above definition of expansive soils. PI_{cor} and EI_{cor} are defined as:

$$PI_{cor} = PI \times \frac{\text{(\% Passing No. 40 Sieve)}}{100} \quad \text{and} \quad EI_{cor} = EI \times \frac{\text{(\% Passing No. 4 Sieve)}}{100}$$

4-~~0402~~ 0502 Inspection

4-~~0402.1~~ 0502.1 All construction involving problem soils must be performed under the full-time inspection of the geotechnical engineer.

4-~~0402.2~~ 0502.2 The geotechnical engineer shall furnish a written opinion to the County as to whether or not work has been performed in accordance with the approved plans, and his recommendations for work in the vicinity of the units to be occupied prior to the issuance of residential or non-residential use permits.

4-~~0403~~ 0503 Minimum Standards Required for ~~Site~~ Density Testing of Compacted Fill Soil (68-00-PFM)

4-~~0503.1~~ 0503.1 (68-00-PFM) The minimum frequency of field density testing shall be as listed in Table 4.~~1~~2, unless otherwise approved by the Director. The testing frequencies are the minimums considered necessary to provide effective quality control of soil and aggregate material compactive effort under normal conditions. Additional testing other than that specified should be performed if deemed necessary by the Inspection and Testing Agency, the Geotechnical Engineer of Record, or the Fairfax County Site Inspector. All testing shall be in conformance with approved VDOT test methods. In the event that the testing frequencies are specified to be greater in other applicable standards or specifications, those frequencies shall supersede the frequencies listed in Table 4.~~1~~2.

4-~~0500~~ 0600 ~~GRB~~GEOTECHNICAL REVIEW BOARD (GRB)

4-~~0501~~ 0601 Membership. The GRB, as established by the Board, shall consist of 3 members and 3 respective alternates appointed by the Board.

4-~~0501.1~~ 0601.1 Members and alternates shall be either Professional Engineers registered in Virginia, specializing in soil and foundation engineering, or Engineering Geologists, licensed to practice engineering in Virginia.

4-~~0501.2~~ 0601.2 Appointments shall be made for 3 years, with staggered terms, from a list of eligible nominees recommended by the County Executive.

4-~~0502~~ 0602 Nominations

4-~~0502.1~~ 0602.1 The list of eligible nominees shall be furnished to the County Executive by the Director.

4-~~0502.2~~ 0602.2 The Director shall solicit candidates or nominees from the following professional organizations of soil engineers and engineering geologists and from other sources: ASCE, American Council of Engineering Companies of Metropolitan Washington (ACEC/MW)~~Consulting Engineers Council of Metropolitan Washington,~~ ASFE~~Association of Soil and Foundation Engineers~~, Virginia Society of Professional Engineers, ~~VPI~~Virginia Tech, ~~American Institute of Professional Geologists, and AEG,~~ and WACEL. Names of candidates shall be submitted along with supporting data to substantiate the qualifications of the candidate(s).

4-~~0502.3~~ 0602.3 The Director of ~~the Office of Site~~ Land Development Services, DPWES, shall serve as secretary to the GRB, and shall be a non-voting member.

4-~~0502.4~~ 0602.4 The respective alternate to a member of the GRB shall serve whenever that member cannot serve due to illness, conflict of interest or other reasons.

4-~~0503~~ 0603 Review and Processing of Reports, Plans and Specifications

4-~~0503.1~~ 0603.1 The GRB shall review reports, plans, and specifications submitted to the Director and make recommendations to the Director. The recommendations may be for approval, denial, additional information or revisions of plans and specifications as appropriate. This review is intended to be limited to geotechnical aspects and foundation design only.

4-~~0503.2~~ 0603.2 Decisions for approval of plans are to be made by the Director taking into consideration recommendations received from the GRB. The recommendations of the GRB shall not be binding on the Director.

4-~~0504~~ 0604 Compensation. GRB members shall be compensated at the rate determined by the Board for work performed in connection with the review of projects assigned by the Director.

TABLE 4.~~1~~2 Minimum Standards Required for ~~Site~~ Density Testing of Compacted Fill Soil (92-06-PFM, 68-00-PFM)

TEST LOCATIONS	TESTING FREQUENCY
Embankments Fill sections for streets, travelways, and pipestem driveways	One density test shall be performed per 5000 ft² (500 m²) per 6" (150mm) compacted lift. The embankment test shall not be performed at the same spot where the utility trench backfill test was performed. Trench testing shall be performed in addition to the embankment test. Under curb and gutter, one density test shall be per-formed per 300 ft. (90m) on alternating sides.
Subgrade Cut in existing fill for streets, travelways, and pipestem driveways	Proofrolling, evaluation and approval by the geotechnical-cal engineer of record (undercut and stabilization may be necessary as determined by the geotechnical engineer of record). The exception to this is in the pro-posed underground utilities, where the existing fill shall be completely removed and replaced with new engineered fill placed and compacted as per 4-0401.2, for utility support.
Subgrade Cut in natural soils	Proofrolling, evaluation and approval by the geotechnical-cal engineer of record.
Subbase Material For streets, travelways, and pipestem driveways	One density test shall be performed per 5000 ft² (500 m²) per 6" (150mm) compacted lift. When the subbase aggregate is placed in layers or lifts, each lift shall be tested. Under curb and gutter when placed before the subbase material in the street, perform one density test per 300 ft (90m) on alternating sides.
Base Material	One density test shall be performed per 5000 ft² (500 m²) at the finished base grade. When the base aggregate is placed in layers or lifts, each 6" (150mm) compacted lift shall be tested at the required frequency.
Storm Drainage System - Backfill *	One density test shall be performed per 300' (90m) and at vertical intervals not to exceed 12" (300mm).
Sanitary Sewer, Water and Gas Mains - Backfill * (Note: Field density test reports must be provided to the Fairfax County Site Inspector before field approval is given for issuance of tap permits.)	One density test shall be performed per 300' ft (90m) or between manholes if less than 300' (90m) apart and at vertical intervals not to exceed 12" (300mm). Refer to § 10-0104.2L(13) and Plate Nos. 18-10 (18M-10) or 19-10 (19M-10).

Sanitary Sewer, Water and Gas Laterals - Backfill for Stub Constructed in Conjunction with Utility Main *	One density test shall be performed per 5 laterals and at vertical intervals not to exceed 12" (300mm).
Sidewalks and Driveway Aprons	Sidewalk subgrade: One density test shall be performed per 500' (150m) on alternating sides at the subgrade elevation. A minimum of two density tests per street is required. Driveway apron: One density test per apron shall be performed.
Asphalt Concrete Pavement (Note: The thin lift nuclear density test can be used for any surface course placed directly over an aggregate pavement or on a lift of 135 lbs/yd² (73.24 Kg/m²) (or greater) that is placed on an asphalt pavement course).	*Saw Cuts or Cores* • Two cuts or cores represent one test. A minimum of two tests per street are required regardless of the street length. • One test shall be performed per 500' (150m) of roadway or 1000' (300m) of any pass made by a paving train. *OR Conventional Nuclear Density Gauge* • One test shall be performed per 500' (150m) of roadway. • Five tests shall be performed in each test section. A minimum of two test sections per street is required regardless of the length of the street. *Thin Lift Nuclear Density Gauge* Test areas are defined as lots and sublots. A lot consists of 5000' (1500m) of a pass made by a paving train. Each lot is divided into five sublots of equal size. Two tests will be performed on each sublot. Each separate street shall consist of at least one lot. Streets less than 500' (150m) in length shall be tested a minimum of twice.

* Testing required beneath structures only, including but not limited to sidewalks, driveways, streets and stoops.

Proposed Amendment to Chapter 6 (Storm Drain)
of
The Public Facilities Manual

Deletions are shown as strikeouts and insertions are underlined.

Amend §6-0101 (Drainage Systems) of the Public Facilities Manual, by revising paragraph 6-0101.3C to read as follows:

6-0101.3C (91-06-PFM) Engineering Properties of Fairfax County Soils are available from the USDA-NRCS website. ~~published by Fairfax County Department of Public Works and Environmental Services.~~

Amend §6-0203 (Analysis of Downstream Drainage System) of the Public Facilities Manual by revising paragraph 6-0203.4A(2) to read as follows:

6-0203.4A(2) The shear stress for both the predevelopment condition and the post-development condition for the 2-year storm shall be plotted in relation to time at each cross-section. On each graph, the permissible shear stress also shall be plotted. The permissible shear stress is based on the soil type, and may be determined for cohesive soils from Plate 76-6 (Plate 76M-6) and for non-cohesive soils from Plate 77-6 (Plate 77-M-6). The soil type may be determined by field test or the soil type designated on the County soils maps may be used. If the soil type is designated using the County soils maps, the most conservative permissible shear stress for the soil type shall be used. The plans shall indicate how the soil type was determined. The County soils maps are available on the county website, and the soil properties are available from the USDA-NRCS website. The area between the permissible shear stress and the actual shear stress on the graph is erosive work on the channel. The erosive work for the post-development condition shall be less than the erosive work for predevelopment condition by a percentage equal to the required proportional improvement.

Amend §6-1002 (Side Ditches and Median Ditches) of the Public Facilities Manual by revising paragraph 6-1002.2G to read as follows:

6-1002.2G Where the velocity, as determined above, exceeds the allowable velocity, as determined from the soil classification in the geotechnical report ~~soils report~~, the ditch shall be lined.

Amend §6-1304 (Pervious Pavement) of the Public Facilities Manual by revising paragraph 6-1304.4K to read as follows:

6-1304.4K Side slopes of the facility excavated below ground may be as steep as the *in situ* soils will permit. The bottom of the excavated bed shall be level or nearly level. All excavation must

be performed in accordance with Virginia Occupational Safety and Health (VOSH) requirements. If the facility is located on problem soils, as defined in Section 107-2-1 (j) of the County Code ~~(such as marine clays)~~, a professional authorized by the State ~~geotechnical engineer~~ shall specify the maximum acceptable slope for the excavation.

Amend §6-1307 (Bioretention Filters and Basins) of the Public Facilities Manual by revising paragraph 6-1307.4G to read as follows:

6-1307.4G The side slopes of the facility above ground shall be a maximum of 3:1. Where space permits, gentle side slopes (e.g. 5:1) are encouraged to blend the facility into the surrounding landscape. Side slopes of the facility excavated below ground may be as steep as the in situ soils will permit. All excavation must be performed in accordance with Virginia Occupational Safety and Health (VOSH) requirements. If the facility is located on problem soils, as defined in Section 107-2-1 (j) of the County Code ~~(such as marine clays)~~, a professional authorized by the State ~~engineer with experience in geotechnical engineering~~ shall specify the maximum acceptable slope.

Amend §6-1605 (Geotechnical Design Guidelines for Stormwater Management Reservoirs with Earthdams) of the Public Facilities Manual by revising paragraph 6-1605.2C(1)to read as follows:

6-1605.2C(1) Field Investigation. The field investigation program shall be performed to explore the subsurface conditions for the proposed embankment dam, reservoir and borrow area. The field investigation program must include: (1) review of available data; (2) field reconnaissance; and (3) subsurface exploration. Existing information such as topographic and geologic data should be reviewed. References such as soil maps, the soil properties available from the USDA-NRCS website ~~General Ratings for Dams, Embankments and Reservoirs (Table 6.27 following § 6-1605.6F(2))~~, and any other sources of information should be reviewed. This review of available data should be followed by a field reconnaissance of the site of the dam and reservoir. The subsurface exploration program, consisting of test borings, test pits, or both, should be developed based on the complexity of the geologic and topographic features disclosed by the previous phases. Except when adequate measures are taken to restore the natural condition of excavations, test pits shall be in areas outside the alignment of the dam. At a minimum, 3 test borings shall be located along the dam alignment (centerline) and along the principal spillway profile at intervals not to exceed 100' (30m). Additional borings shall be required at each major structure. Borings also shall be required throughout the ponding area at a density of at least 1 per acre (0.4 ha) (evenly distributed) with a minimum of 2 borings for ponding areas less than 2 acres (0.8 ha). The ponding area shall be defined as that area inundated by the 2-yr water surface elevation. The depth of borings shall extend to competent material or to a depth equal to the lesser of either the embankment height or the foundation width. The use of geophysical techniques where applicable is encouraged. The subsurface exploration program shall be designed and implemented to evaluate the foundations, abutments, reservoir area and embankment design and any other pertinent geological considerations. Insitu testing, such as

permeability tests, undisturbed sampling and installation of piezometers may be required depending upon the site conditions and anticipated designs.

Amend §6-1900 (Tables) of the Public Facilities Manual by deleting the referenced to Table 6.27.

STANDARD DESIGNATION	TABLE NO.	DESCRIPTION	SECTION
N/A	6.26	10-Year Storm Routing	6-1305
~~N/A~~	~~6.27~~	~~General Ratings for Dams, Embankments and Reservoirs~~	~~6-1605~~
N/A	6.28	Aggregate Gradation	6-1304.8B

Amend §6-1605 (Geotechnical Design Guidelines for Stormwater Management Reservoir with Earthdams) by deleting Table 6.27 General Ratings for Dams, Embankments and Reservoirs.

~~Table 6.27 General Ratings for Dams, Embankments and Reservoirs~~ ~~(56-96-PFM)~~

~~No.~~	~~Soil Name[1]~~	~~Physiographic Province/ Parent Material/ Landscape Position[2]~~	~~Typical USCS Classification[3]~~	~~Embankment Materials[4]~~	~~Embankment Foundation[4]~~	~~Core/Liner Materials[4]~~	~~Seepage Potential[5]~~	~~Erosion Potential[6]~~
~~1~~	~~Mixed Alluvial~~	~~(Tr, Pd, Cp) Silty, sandy, and clayey recent alluvium in floodplains~~	~~Variable – CH to GM~~	~~Marginal – W, P, O~~	~~Poor – B, W, O~~	~~Marginal – W, P, O~~	~~Moderate~~	~~Low~~
~~2~~	~~Chewacla~~	~~(Pd) Silty alluvium on low terraces in floodplains~~	~~ML~~	~~Marginal – W, P~~	~~Poor – B, W~~	~~Marginal – W, P~~	~~Moderate~~	~~Low~~
~~3~~	~~Congaree~~	~~(Pd) Silty alluvium on low terraces in floodplains~~	~~ML~~	~~Fair – P, W~~	~~Marginal – B, W~~	~~Fair – P, W~~	~~Moderate~~	~~Low~~
~~5~~	~~Wehadkee~~	~~(Pd) Silty and clayey alluvium on low terraces in floodplains~~	~~CL, MH, ML, CH~~	~~Marginal – W, P~~	~~Poor – B, W~~	~~Marginal – W, P~~	~~Low~~	~~Low~~
~~6~~	~~Hyattsville~~	~~(Cp) Silty to sandy local alluvium overlying Coastal Plain sediments~~	~~CL, SM, SC~~	~~Fair – P, W~~	~~Fair – B, W~~	~~Marginal – T, P, W~~	~~Moderate~~	~~Low~~
~~8~~	~~Worsham~~	~~(Pd) Local alluvium overlying schist and granite~~	~~ML-CL, ML, CH, CL~~	~~Marginal – W, M, P~~	~~Poor – B, W~~	~~Marginal – M, P, W~~	~~Moderate~~	~~Low~~
~~10~~	~~Glenville~~	~~(Pd) Local alluvium overlying schist and granite~~	~~ML, ML-CL, SM~~	~~Fair – M, P, W~~	~~Fair – B, W~~	~~Marginal – M, P, W~~	~~Moderate~~	~~Moderate~~
~~11~~	~~Bermudian~~	~~(Tr) Alluvium on low terraces in floodplains~~	~~ML-CL, CL~~	~~Fair – P, K~~	~~Marginal – B, W~~	~~Fair – P, T, K~~	~~Moderate~~	~~Low~~
~~12~~	~~Rowland~~	~~(Tr) Alluvium on low terraces in floodplains~~	~~ML-CL, ML~~	~~Fair – P, W, K~~	~~Poor – B, W~~	~~Fair – P, T, W, K~~	~~Low~~	~~Low~~

Table 6.27 General Ratings for Dams, Embankments and Reservoirs (56-96-PFM)

No.	Soil Name[1]	Physiographic Province/ Parent Material/ Landscape Position[2]	Typical USCS Classification[3]	Embankment Materials[4]	Embankment Foundation[4]	Core/Liner Materials[4]	Seepage Potential[5]	Erosion Potential[6]
13	Bowmansville	(Tr) Alluvium on low terraces in floodplains	ML-CL, CL, CH	Marginal – W, P, K	Poor – B, W	Marginal – W, P, K	Low	Low
14	Manassas	(Tr) Local alluvium overlying siltstone and sandstone	ML-CL, CL, ML, GC	Fair – P, W, K	Fair – B, W	Fair – P, T, W, K	Moderate	Moderate
15	Muck	(Cp) Organic sediments	OL, OH	Poor – W, O	Poor – B, W, O	Poor – W, O	Moderate	Low
18 19	Rocky Land and Very Rocky Land (Acid)	(Pd) Schist and granite	ML, SM	Marginal – D, R, M, P	Good	Poor – D, R, M, P	High	High
20	Meadowville	(Pd) Local alluvium overlying schist and granite	ML-CL, CL, ML, SM	Fair – M, P, W	Fair – B, W	Marginal – M, P, W	Moderate	Moderate
21	Manor	(Pd) Schist	ML, SM	Fair – M, P	Good	Poor – M, P	High	High
23	Captina	(Pd) High terraces near streams	CL-ML, SM, SM-SC	Fair – P, W	Fair, B, W	Fair – P, T, W	Moderate	Moderate
24	Elioak	(Pd) Schist	ML-CL, MH, SM	Fair – M, P	Good	Fair – M, P	High	High
26	Bertie	(Cp) Silty Coastal Plain sediments	ML, CL	Fair – P, W	Fair – B, W	Marginal – P, W	Moderate	Moderate
27	Legore sil	(Tr) Diabase/diorite	ML, CL, MH-CH	Marginal – D	Good	Marginal – T, D	Low	Moderate
28	Montalto sil	(Tr) Diabase/diorite	ML, CL, MH-CH	Good	Good	Good	Low	Moderate
29	Legore st sil	(Tr) Diabase/diorite	ML, CL, MH-CH	Marginal – D	Good	Marginal – T, D	Low	Moderate
30	Huntington	(Pd, Cp) Aluvium on low terraces in Potomac River floodplain	ML-CL, CL, ML	Fair – P	Fair – B, W	Fair – P	Moderate	Low
31	Lindside	(Pd, Cp) Aluvium on low terraces in Potomac River floodplain	ML-CL, CL, ML	Fair – W, P	Marginal – B, W	Fair – W, P	Moderate	Low
32	Fairfax sil	(Pd) Silty upland terraces overlying schist and granite	ML, ML-CL, SM	Fair – P	Good	Marginal – P, M	Moderate	High
33	Melvin	(Pd, Cp) Alluvium on low terraces in Potomac River floodplain	ML-CL, CL, ML	Marginal – W, P	Poor – B, W	Marginal – W, P	Moderate	Low
34	Woodstown	(Cp) Sandy Coastal Plain sediments	SM-SC, SM, SC	Fair – P, W	Fair – W	Marginal – T, P, W	High	Low
35	Manteo	(Pd) Schist	CL, ML, SM	Marginal – D, M, P	Good	Poor – D, M, P	High	High

Table 6.27 General Ratings for Dams, Embankments and Reservoirs (56-96-PFM)

No.	Soil Name[1]	Physiographic Province/ Parent Material/ Landscape Position[2]	Typical USCS Classification[3]	Embankment Materials[4]	Embankment Foundation[4]	Core/Liner Materials[4]	Seepage Potential[5]	Erosion Potential[6]
37 38	Beltsville sil Beltsville 1	(Cp) Silty uplands overlying dense gravelly Coastal Plain sediments or weathered schist and granite	ML, CL, ML-CL, SC	Fair P, W	Good	Marginal T, P, W	Moderate	Moderate
39	Othello	(Cp) Silty and clayey Coastal Plain sediments	ML CL, ML, MH, CH, SM	Marginal W, P	Poor B, W	Marginal W, P	Moderate	Low
40	Mecklenburg	(Tr) Diabase	ML CL, MH, SM SC	Fair C	Marginal Z	Fair C	Low	Moderate
41 42	Rocky Land and Very Rocky Land (Iredell Group)	(Tr) Diabase	ML CL, CH, SC, SM	Marginal R, D, C	Marginal Z	Marginal R, D, C	Low	Moderate
43	Masada gravelly loam	(Pd) Gravelly high terraces near streams	GM, ML, GC, CL	Good	Good	Fair T	Moderate	Moderate
44	Caroline	(Cp) Silty and Clayey Coastal Plain sediments	ML, MH, CH	Fair C	Marginal B, C	Fair C	Moderate	Moderate
45	Matapeake	(Cp) Silty Coastal Plain sediments	ML CL, CL, ML, SM	Fair P	Good	Fair P	Low	Moderate
46	Mattapex	(Cp) Silty Coastal Plain sediments	ML CL, ML, CL, SM	Fair P, W	Good	Fair P, W	Low	Moderate
47	Dragston	(Cp) Sandy Coastal Plain sediments	SC, SM	Fair W, P	Fair B, W	Marginal T, W, P	High	Low
48	Iredell	(Tr) Diabase	ML CL, CH, SC	Fair C, W	Marginal Z	Fair C, W	Low	Moderate
49	Lunt fine sandy loam	(Cp) Sandy to clayey Coastal Plain sediments	SM SC, CH, SC	Fair C, U	Marginal B, C, U	Fair T	High	Moderate
50	Iredell Mecklenburg st sil	(Tr) Diabase	ML CL, MH, CH, SC	Fair C, W, R	Marginal Z	Fair C, W, R	Moderate	Moderate
51	Keyport	(Cp) Silty and clayey Coastal Plain sediments	ML, CL, MH, CH	Fair W	Fair B, W	Fair W	Low	Moderate
52	Elbert (Iredell Group)	(Tr) Local alluvium overlying diabase bedrock	CL, CH, MH CH, SM SC	Marginal W, C	Poor B, W, C	Marginal W, C	Low	Low
53	Lenoir	(Cp) Silty and clayey Coastal Plain sediments	ML, ML CL, MH CH, CL	Fair W	Marginal B, W	Fair W	Low	Moderate
54	Sassafras	(Cp) Sandy Coastal Plain sediments	SM, SC	Fair P	Good	Marginal T, P	High	Moderate
55	Glenelg	(Pd) Schist	ML, SM	Fair M, P	Good	Poor M, P	High	High
56	Kempsville	(Cp) Silty and sandy Coastal Plain sediments	ML, SM, SM SC, CL ML, SC	Fair P	Good	Marginal T, P	Moderate	Moderate

Table 6.27 General Ratings for Dams, Embankments and Reservoirs (56-96-PFM)

No.	Soil Name[1]	Physiographic Province/ Parent Material/ Landscape Position[2]	Typical USCS Classification[3]	Embankment Materials[4]	Embankment Foundation[4]	Core/Liner Materials[4]	Seepage Potential[5]	Erosion Potential[6]
57	Brecknock 1	(Tr) Baked sandstone (hornfels)	ML-CL, CL	Fair K	Good	Fair K	Moderate	Moderate
59	Orange	(Pd) Greenstone (metabasalt)	ML, CL, CH	Fair C, W	Marginal Z	Fair C, W	Low	Moderate
60	Appling	(Pd) Granite and gneiss	ML, MH-CH, MH, SC	Good	Good	Fair T	Moderate	High
61	Loamy/Gravelly Sediments	(Cp) Sandy and gravelly Coastal Plain sediments	CL, ML, MH, SM, GM, GC	Marginal T, C, U	Marginal B, C, U	Marginal T, C	High	High
62	Brecknock gravelly silt loam	(Tr) Baked siltsone (hornfels)	ML-CL, ML	Fair K	Good	Fair K	Moderate	Moderate
63	Louisburg	(Pd) Granite and gneiss	SM	Good	Good	Marginal T	Moderate	High
64	Silty/Clayey Sediments	(Cp) Silty and clayey Cretaceous-age Coastal Plain sediments	CH, MH, SC, CL, ML	Marginal C, U	Poor B, C, U	Marginal C, T	High	High
65	Colfax	(Pd) Granite and gneiss	ML, CL, SC	Fair W	Marginal B,W	Fair W, T	Low	Moderate
66	Lloyd	(Pd) Greenstone and schist	ML, MH	Good	Good	Good	Low	Moderate
67	Penn fsl	(Tr) Sandstone	SM, ML-CL, CL, ML	Fair P, K, D	Good	Fair P, K, D	High	High
68	Roanoke	(Pd) Clayey alluvium on low terraces in floodplains	CH, MH, CL, CL-ML, GM-GC	Marginal W	Poor B, W	Marginal W	Low	Low
69	Enon	(Pd) Greenstone and schist	ML, MH-CH, ML-CL	Good	Fair B	Good	Low	Severe
70	State	(Cp) Sandy alluvium on low terraces in floodplains	SM, SC, CL	Fair P	Good	Marginal T, P	High	Low
71	Bucks sil	(Tr) Siltstone	ML-CL, MH-CH, ML	Fair P, K	Good	Fair P, K	Moderate	Moderate
72	Bucks 1	(Tr) Sandstone	ML, CL, ML-CL	Fair P, K	Good	Fair P, K	Moderate	Moderate
73	Penn sil	(Tr) Siltstone and sandstone	ML-CL, ML, GC	Fair P, K, D	Good	Fair T, P, K, D	Moderate	High
75	Penn 1	(Tr) Sandstone and siltstone	ML-CL, ML, CL	Fair D, P, K	Good	Fair D, P, K	Moderate	High
76	Calverton 1	(Tr) Siltstone and sandstone	ML-CL, CL, MH-CH, SM-SC	Fair W, K	Marginal B, W	Fair W, K	Low	Moderate
77	Penn sh sil	(Tr) Siltstone and sandstone	ML-CL, ML, GM-GC	Marginal P, K, D	Good	Marginal D, T, P, K	Moderate	High
78	Calverton sil	(Tr) Siltstone and sandstone	ML-CL, ML, MH-CH, SM-SC	Fair W, K	Marginal B, W	Fair W, K	Low	Moderate
79	Kelly	(Tr) Diabase and siltstone (hornfels)	ML-CL, CH, MH	Fair K, C	Marginal Z	Fair K, C	Moderate	Moderate

Table 6.27 General Ratings for Dams, Embankments and Reservoirs (56-96-PFM)

No.	Soil Name[1]	Physiographic Province/ Parent Material/ Landscape Position[2]	Typical USCS Classification[3]	Embankment Materials[4]	Embankment Foundation[4]	Core/Liner Materials[4]	Seepage Potential[5]	Erosion Potential[6]
80	Croton	(Tr) Siltstone and sandstone	ML-CL, ML, CH, MH, GM-GC	Marginal – W, K	Marginal – B, W	Marginal – W, K	Low	Low
83	Galestown	(Cp) Sandy Coastal Plain sediments	SM, SC	Fair – P	Good	Poor – T	High	Low
84	Fallsington	(Cp) Sandy Coastal Plain sediments	SM-SC, SM, SC	Marginal – W, P	Poor – B, W	Marginal – W, T	High	Low
85	Elkton	(Cp) Clayey Coastal Plain sediments	ML-CL, ML, CL, CH, MH	Marginal – W, C	Poor – B, W, C	Marginal – W, C	Low	Low
86	Klej	(Cp) Sandy Coastal Plain sediments	SM, SC	Fair – W	Fair – B, W	Poor – T	High	Low
87	Wickham	(Pd) Silty high terraces along streams	ML, SC, CL	Good	Good	Good	Low	Moderate
88	Hiwassee sil	(Cp) Silty high terraces along streams	ML, CL, MH	Good	Good	Good	Low	Moderate
89	Tidal Marsh	(Cp) Organic soils in recent alluvium along the tidal Potomac River	OL, OH	Poor – W, O	Poor – B, W, O	Poor – W, O	Moderate	Low
90	Augusta vfsl	(Pd, Cp) Silty and clayey alluvium on low terraces in floodplains	ML, CL, MH-CH, GC	Fair – W	Fair – B, W	Marginal – T, W	Low	Moderate
91	Birdsboro	(Tr) Silty and clayey alluvium on low to high terraces near streams	ML-CL, CL	Fair – P, W	Marginal – B, W	Fair – P, W	Low	Moderate
92	Raritan	(Tr) Silty and clayey alluvium on low to high terraces near streams	ML-CL, CH-MH, GM-GC	Fair – W, P	Marginal – B, W	Fair – W, P	Low	Moderate
104	Catlett	(Tr) Baked siltstone and sandstone (hornfels)	ML-CL, ML	Marginal – D, P, K	Good	Marginal – D, P, K	Moderate	Moderate
110	Augusta 1	(Pd, Cp) Silty and clayey alluvium on low terraces in floodplains	ML, CL, MH-CH, GC	Fair – W	Fair – B, W	Marginal – T, W	Low	Moderate
112	Augusta sl	(Pd, Cp) Silty and calyey alluvium on low terraces in floodplains	ML, CL, MH-CH, GC	Fair – W	Fair – B, W	Marginal – T, W	Low	Moderate
113	Fairfax gr sil	(Pd) Silty and gravelly upland terraces overlying schist and granite	ML, ML-CL, SM, GM	Fair – P	Good	Marginal – P, T, M	High	High
114	Masada fsl	(Pd) Gravelly high terraces along streams	GM, ML, GC, CL	Good	Good	Fair – T	Moderate	Moderate
115	Hiwassee fsl	(Pd) Silty high terraces along streams	ML, CL, MH	Good	Good	Good	Low	Moderate
116	Christiana	(Cp) Silty and clayey Cretaceous-age Coastal Plain sediments	MH, CH	Poor – C, U	Poor – U, C, B	Marginal – C	Moderate	Moderate

Table 6.27 General Ratings for Dams, Embankments and Reservoirs (56-96-PFM)

No.	Soil Name[1]	Physiographic Province/ Parent Material/ Landscape Position[2]	Typical USCS Classification[3]	Embankment Materials[4]	Embankment Foundation[4]	Core/Liner Materials[4]	Seepage Potential[5]	Erosion Potential[6]
117	Marsh (Fresh)	(Cp) Organic soils and alluvium along streams	OL, OH	Poor – W, O	Poor – B, W, O	Poor – W, O	Moderate	Low
118	Marine Clay	(Cp) Clayey and silty Cretaceous-age Coastal Plain sediments	CH, MH	Poor – C, U	Poor, U, C, B	Marginal – C	Moderate	High
120	Altavista	(Cp) Sandy and clayey alluvium on low terraces in floodplains	CL, CL-ML, SC, SM-SC	Fair – P, W	Fair – W	Fair – P, W	Moderate	Moderate
128	Montalto stsil	(Tr) Diabase/diorite	ML, CL, MH-CH	Fair – R	Good	Fair – T, R	Low	Moderate
129	Montalto rsil	(Tr) Diabase/diorite	ML, CL, MH-CH	Fair – R	Good	Fair – T, R	Low	Moderate
132	Mayodan	(Tr) Sandstone conglomerate	SM, ML, SM-SC, MH	Good	Good	Good	Low	Moderate
141 142	Rocky Land and Very Rocky Land (Orange Group)	(Pd) Greenstone (metabasalt)	ML, ML-CL, CH	Marginal – R, D, C	Marginal – Z	Marginal – R, D, C	Low	Moderate
148	Iredell – Mecklenburg sil	(Tr) Diabase	ML-CL, MH, CH, SC	Fair – C, W	Marginal – Z	Fair – C, W	Low	Moderate
149	Lunt sil	(Cp) Clayey and sandy Coastal Plain sediments (includes Cretaceous-age sediments)	SM-SC, CH, MH	Marginal – C, U	Marginal – U, B, C	Marginal – C	Moderate	Moderate
152	Elbert (Orange Group)	(Pd) Local alluvium overlying Greenstone (metabasalt)	CL, CH, MH-CH	Marginal – W, C	Poor – B, W, C	Marginal – W, C	Low	Low
232	Fairfax 1	(Pd) Clayey and silty upland terraces overlying weathered schist and granite	ML, MH-CH, MH, ML-CL	Fair – P	Good	Fair – P	Moderate	High
273	Readington	(Tr) Siltsone and sandstone	ML-CL, CL, ML	Fair – P, K, D, W	Good	Fair – P, K, D, W	Moderate	Moderate

NOTES:

Soil Name[1] (56-96-PFM)

Soil names are taken from the **Soil Survey of Fairfax County, Virginia, Series 1955, No. 11, Issued May 1963**. Additional soil series, not included in the original survey, occur in revised soil maps of Fairfax County. Since the original soil survey in 1955, the USDA Soil Conservation Service has continued to revise and update its list of soils found state-wide in Virginia. Property descriptions and interpretations for some soils were modified as more information was gathered, and some soil names were changed. As a result, some soil series used in Fairfax County may not coincide in properties and interpretations with the same soil names used elsewhere in Virginia. Properties and engineering interpretations in this table are specific to Fairfax County, and are based on surveys and data gathered by the County since the original survey.

Soil names include modifiers that indicate surface texture (proportion of sand, silt, clay, gravel, stones, etc.). Differences in surface texture often indicate parent material differences and reflect other differences in the soil which may affect engineering properties. The following abbreviations (USDA texture name) are used in this table: fsl (fine sandy loam), gr (gravelly), l (loam), r (rocky), sh (shaly), sil (silt loam), sl (sandy loam), st (stony), vfsl (very fine sandy loam).

Physiographic Province/ Parent Material/ Landscape Position[2] (56-96-PFM)

Physiographic Province, Parent Material, and Landscape Position defines general geologic area, source of soil constituent, and/or landscape setting. Physiographic Province is defined as: Tr = Triassic, Pd = Piedmont, and Cp = Coastal Plain. Detailed geologic maps are available from the U.S. Geological Survey.

Typical USCS Classification[3] (56-96-PFM)

Typical Unified Soil Classification System (USCS) Classifications listed here are estimates based on limited laboratory analyses (published data include the Soil Survey of Fairfax County, Virginia and F.H.A. Report No. 373 "Engineering Soil Classification For Residential Development") and on observations and test data assembled by the County. Classes typically found in each soil type are listed. Site-specific variations occur within soil types. These soil classifications should be used for planning purposes only and should not replace on-site investigations for significant dam structures.

Key to General Ratings For Embankment Materials, Embankment Foundation, and Core/Liner Materials[4]

The design of an earthen structure should be preceded by careful investigation of both the cut and fill areas. Soils typically occur as horizons or layers that change significantly in gradation and other physical properties with depth and horizontal distance. For example, the Iredell (48) series consists of less than 1 foot (0.3 meters) of silts overlying 1 to 3 feet (0.3 to 1 meters) of highly plastic clay, which in turn overlies sandy to clayey decomposed bedrock of variable depth. The depth to bedrock or large boulders in the Iredell soils may vary from 3 to 15 feet (1 to 4.6 meters). For these and other soils, care should be taken in engineering investigations to identify significant soil strata changes that occur over short distances. Previous excavation or filling activities may significantly alter site conditions.

As a general rule in embankment construction, all visible organic debris such as roots and limbs should be removed from the fill material prior to compaction to a specified density. Soils with organic matter content exceeding five percent by weight should not be used as structural fill. Stones greater than 4 inches to 6 inches (100 millimeters to 150 millimeters) in diameter should be removed from the fill material. It is essential that a good bond be established between the soils in the dam and in the foundation by removing loose organic debris, organic-rich soils, and soft soils prior to compacting and scarifying the subgrade.

For reestablishment of vegetation after construction, a minimum of 6 inches (150 millimeters) of topsoil, limed and fertilized, should be placed on the embankment surface.

Ratings for **Embankment Materials** evaluate the soil as a source of fill for embankment construction. Ratings apply to the upper 5 feet (1.5 meters) of in-situ soil material and consider that mixing of the soil materials will occur during construction operations.

Ratings for **Core/Liner Materials** evaluate the soil as a source of low-permeability materials to be used as an impervious soil core within the dam or as an upstream liner above highly permeable substrata to minimize seepage loss. Segregation of acceptable soil strata from surrounding soils is usually necessary to minimize contamination.

Ratings for **Embankment Foundations** are based on the ability of the natural (undisturbed) soil to support an embankment without excessive settlement occurring.

Ratings:

Good = No significant problems in natural undisturbed soils.
Fair = Minor potential problems affecting design or construction.
Marginal = Significant problems that must be considered in design and construction.
Poor = Major problems that must be addressed during the design and construction to ensure satisfactory performance of structures.

Key to Problems and Characteristics For Embankment Materials, Embankment Foundation, and Core/Liner Materials

B = Low bearing values due to soft or saturated soil strata may provide marginal to poor support for the dam and result in significant total or differential settlement.
C = High shrink-swell clays are difficult to work or compact under certain moisture contents (too wet or too dry). These clays are typically suitable for liner materials, but may be difficult to compact properly.
D = Shallow depth to bedrock results in a thin soil layer and lack of sufficient materials for the embankment or core. Suitable soil material may need to be imported from off-site.
K = The bedrock disintegrates (slakes) rapidly when exposed to surface or subsurface weathering, which may lead to embankment instability unless proper gradation is attained during compaction.

M = High mica content makes the soil difficult to compact and increases the susceptibility to piping and embankment slope failure.

O = High organic matter content (organic strata, loose debris, or organic enrichment in mineral horizons) results in compression and differential settlement under the embankment foundation. The organic materials and organic-enriched soils (greater than 5 percent organic matter) are difficult to compact properly and will decay over time, reducing the embankment and core stability.

P = Piping hazard (internal erosion and channeling) may occur in the dam foundation as a result of no or inadequate core construction, and within embankments because of poor compaction.

R = High content of rocks or stones in the soil interferes with compaction, grading, workability.

T = Medium to coarse textures (SM or coarser) are suitable for the shell but not the core of the dam.

U = Potentially unstable slopes resulting in slope failure or slope creep may destabilize the dam. Slope failures may occur unless the embankments are constructed at slopes of 4H:1V or flatter.

W = High seasonal water tables result in wet conditions during certain periods of the year, adversely affecting workability and compaction. Wetness problems are minimized during dry periods of the year.

Z = Embankment foundation support is poor in the plastic clay layer, good in underlying saprolite or bedrock.

Seepage Potential[5]

Seepage potential is based on permeability of the near-surface soils and depth to permeable saprolite, fractures bedrock, or other permeable strata. These properties are evaluated based on the potential for seepage loss from the excavated areas within the reservoir, emergency spillway and under the embankment.

Soils with a **high seepage potential** have moderately rapid or rapid permeability in the near-surface soils or have highly permeable saprolite, fractured bedrock, or other permeable strata. Soils with a **moderate seepage potential** have a moderate permeability or have permeable saprolite, bedrock, or other strata, often deeper than 4 feet (1.2 meters). In some predominantly silty or clayey Coastal Plain soils, lateral seepage may occur within permeable strata. Moderately slow to slowly permeable soils which are not likely to be underlain by permeable saprolite, bedrock, or other strata have a **low seepage potential**.

Erosion Potential[6]

Erosion potential is based on the Universal Soil Loss Equation adapted for soils under construction site conditions. Soil erodibility is affected by texture (relative proportion of sand, silt, and clay), rock content, permeability, structure, and slope (natural or man-made).

Soils with a **low erosion potential** are not highly erodible, rarely exceeding soil loss tolerances except on steep unprotected cuts.

Soils with a **moderate erosion potential** are moderately erodible on B (2-7 percent) slopes and highly erodible on C (7-14 percent) slopes or greater (exceeding the soil loss tolerance). Sheet, rill and shallow gully erosion can be expected on unprotected soils during a severe storm.

Soils with a **high erosion potential** are highly erodible, exceeding soil loss tolerances even on B (2-7 percent) slopes. Sheet and rill erosion, with the formation of numerous gullies can be expected on unprotected s

Proposed Amendment to Chapter 11 (Erosion and Sediment Control)
of
The Public Facilities Manual

Deletions are shown as strikeouts and insertions are underlined.

Amend Table of Contents for Chapter 11 of the Public Facilities Manual by deleting references to 11-0409 (Soil Profile and Test Data), and 11-0410 (Reserved), and by renumbering 11-0411 (Biotechnical Slope and Bank Protection) to read as follows:

~~11-0409 Soil Profile and Test Data~~
~~11-0410 (Reserved)~~
11-~~0411~~ 0409 Biotechnical Slope and Bank Protection

Amend Table of Contents for Chapter 11 of the Public Facilities Manual by revising references to Plate Nos. 3-11 (General Soil Map-Fairfax County), 4-11 (Symbols Shown on Soil Maps of the County), and 5-11 (Generalized Stratigraphic Profile of County Soils), 10-11 (Biotechnical Slope Protection), and 11-11 (Super Silt Fence), and by deleting references to Plate Nos. 6-11, 7-11, 8-11, and 9-11 (Engineering Test Data) to read as follows:

11-0500 PLATES

STANDARD DESIGNATION	PLATE NO.	DESCRIPTION	SECTION
N/A	1-11 (1M-11)	Maximum Probable Trap Efficiency of Sediment Basins	11-0109.6
N/A	2-11 (2M-11)	Pipe Outlet Sediment Trap 1 to 3 acres (0.4 to 1.21 hectares)	11-0109.6
N/A	3-11 (3M-11)	Physiographic Provinces ~~General Soil Map~~ Fairfax County, Virginia	11-0408.2
N/A	4-11 (4M-11)	Symbols Shown on Soil Maps of the County	11-0408.~~1~~411
N/A	5-11 (5M-11)	Generalized Stratigraphic Profile of County Soils	11-~~0409~~ 0408.10
~~N/A~~	~~6-11 (6M-11)~~	~~Engineering Test Data~~	~~11-0409~~
~~N/A~~	~~7-11 (7M-11)~~	~~Engineering Test Data~~	~~11-0409~~
~~N/A~~	~~8-11 (8M-11)~~	~~Engineering Test Data~~	~~11-0409~~
~~N/A~~	~~9-11 (9M-11)~~	~~Engineering Test Data~~	~~11-0409~~
N/A	6-11(6M-11)~~10-11 (10M-11)~~	Biotechnical Slope Protection	11-~~0411.6~~ 0409.6
N/A	7-11(7M-11)~~11-11 (11M-11)~~	Super Silt Fence	11-0110.3J

Amend Table of Contents for Chapter 11 of the Public Facilities Manual by revising the references for Table Nos. 11.1 (Grade Class) and 11.3 (Numerical Index-County Soils), and by deleting the reference to Table No. 11.2 (Erosion (Long Term) Symbols to read as follows:

TABLE NO.	DESCRIPTION	SECTION
11.1	Grade Class	11-0408.~~12~~ 10
~~11.2~~	~~Erosion (Long Term) Symbols~~	~~11-0408.12~~
~~11.3~~ 11.2	Numerical Index-County Soils	11-0408.~~12~~ 10

Amend §11-0102 (General Plan Preparation) of the Public Facilities Manual by revising paragraph 11-0102.2 for read as follows:

11-0102.2 (56-96-PFM) For all land proposed for development, a soil map showing soil type boundaries and highlighting areas posing problems for urban development shall be required. Such soil map shall be at a scale of not less than 1" = 500' (1:6000), and shall also identify classification of soil types, based upon the official County soils ~~identification~~ maps ~~or, if not mapped, based upon soils identified by a professional authorized by the State to provide such information~~. This analysis and a resultant E&S control plan shall provide guidance to the developer as to those areas where topography, drainage and soils are most favorable for intended development and the most favorable routing of roads and sewers so as to create the least erosion potential.

Amend §11-0103 (Stage 1) of the Public Facilities Manual by revising paragraphs 11-0103.2A, and 11-0103.2B to read as follows:

11-0103.2A (56-96-PFM) Such areas shall be identified by use of the official soils map ~~current published soil survey maps of the County~~ or by use of supplemental ~~soil surveys~~ geotechnical report prepared by a professional authorized by the State to provide such information.

11-0103.2B (56-96-PFM) ~~Copies of the~~ The official soils map adopted by the Board of Supervisors is available on the county website and published soil survey maps and text are available ~~at~~ on the NRCS website. ~~Department of Public Works and Environmental Services and on the County web site. Publications Counter, the Office of the NVSWCD and the SCS.~~

Amend §11-0103 (Stage 1) of the Public Facilities Manual by deleting paragraph 11-0103.2C.

~~11-0103.2C (56-96-PFM) The latest criteria, including but not limited to those available from the Director, the SCS and the NVSWCD, shall be used as a guide for interpreting the soil survey maps.~~

Amend §11-0110 (Data Availability) of the Public Facilities Manual by revising paragraph 11-0110.3 to read as follows:

11-0110.3 (24-88-PFM) Standards and specifications are provided in the current Virginia E&S Control Handbook. Some supplemental County standards are included in Plates 1-11 (1M-11) thru ~~10-11~~ 7-11 (~~10M-11~~ 7M-11) and Chapter 104 (Erosion and Sedimentation Control) of the Code. § 104-1-8(a) of the Code contains modifications to State standards which are mandatory in the County.

Amend §11-0408 (Soils of the County) of the Public Facilities Manual by revising paragraphs 11-0408.1, 11-0408.2, 11-0408.9, 11-0408.11, 11-0408.12, and 11-0408.13 to read as follows:

11-0408.1 (56-96-PFM) The comprehensive source of information about soils in the County is the Soil Survey of Fairfax County, prepared by NRCS and publicly released in January 2008. This survey describes one hundred-eight (108) units of soils, numbered one (1) through fifty-seven (57), and fifty-nine (59) through one hundred-nine (109). Names for the units of soils were formulated using the NRCS's Soil Taxonomy: 2nd Ed. (see 11-103.2B)
~~The soils in the County are classified into approximately 100 major soil series~~. The differences in soil characteristics (i.e., soil color, texture, depth, drainage, chemistry, permeability, erodibility, etc.) are due to the diversity of parent materials and topography in the County. ~~Soils information available from the County has been carefully and scientifically gathered for many years. A continuing process of evaluation and updating of soils information has been used to provide current information relative to the needs of a growing urban area. A detailed soil survey was prepared by soil scientists who systematically traversed approximately 2/3 of the County, examining many hand auger borings, road-cuts, embankments, and soil test pits to group the similar soils into Series. A soils map was prepared by identifying these areas of similar soils on aerial photographs. Samples of the various soil horizons, or layers from representative soils of each series were analyzed in the laboratory to evaluate physical and chemical properties which affect both agronomic and engineering uses of the soils. For many years the County has pioneered in and benefitted from the practical application of soil survey in-formation for engineering and urban uses (see Plate 3-11 (3M-11)).~~

11-0408.2 ~~3~~ Three major separations, or physiographic provinces, have been identified in the County (see Plate 3-11 (3M-11)):

11-0408.~~9~~ 8 (56-96-PFM) The Erosion Factor and selected engineering data for the County Soils are available on the NRCS website. ~~The estimated erodibility and selected engineering data on the following pages was prepared by the County with supplemental information furnished by the SCS, the NVSWCD and VPI.~~ Additional information and advice concerning the County soils is available from ~~the SCS,~~ the NVSWCD and the NRCS~~VPI~~.

11-0408.~~11~~ 9 Soil survey maps and data should be regarded as excellent guides for conducting preliminary detailed engineering investigations, and in making land-use decisions. They should not be used alone for design or construction purposes.

11-0408.~~12~~ 10 (56-96-PFM) In the following tables, soils are listed by Soil Series name. Soil maps available from the County utilize a numeric system of soil identification, for example, 39B ~~55B2~~:

39 ~~55~~ - Soil Number – Glenelg silt loam (Soil Series name and type) (see Table 11.2 ~~11.3~~)

B - Grade Class - 2% to 7% grades

~~2 - Erosion Class - Moderate erosion existed at time of soil mapping~~

The first number(s) in the legend indicates the Soil Series name and Soil Type (which is the texture of the surface, or A horizon, of the representative soil of the Series). The letter in the legend indicates the grade class. (See Table 11.1.) ~~The second number in the legend indicates the estimated degree of erosion at time of survey. (see Table 11.2).~~

11-0408.~~13~~ 11 (56-96-PFM) The legend used on the County soil maps ~~obtained from the County~~ is located in Plate 4-11 (4M-11).

Amend §11-0408 (Soils of the County) of the Public Facilities Manual by deleting paragraphs 11-0408.8, and 11-0408.10.

~~11-0408.8 (56-96-PFM) The Engineering Test Data, contained in Plates 6-11 (6M-11) thru 9-11 (9M-11) has been prepared by VPI, FHA, State Highway Departments, and universities and colleges. Much of this data is available in the booklet "Soil Survey, Fairfax County, Virginia," a cooperative publication of the SCS, the Virginia Agricultural Experiment Station, VPI and the County, available from the SCS District Office and the NVSWCD. The data may also be found in the FHA publication Engineering Soil Classi-fication for Residential Development. The engineering characteristics are presented with the agricultural descriptions in both publications.~~

~~11-0408.10 (56-96-PFM) Soil Identification Maps for the County may be purchased from the Publica-tions Counter in Suite 156, 12000 Government Cen-ter Parkway, Fairfax, Virginia 22035.~~

Amend §11-0408 (Soils of the County) of the Public Facilities Manual by revising Table 11.1 to read as follows:

TABLE 11.1
GRADE CLASS

A = 0 - 2%
B = 2 - 7%
C = 7 - ~~14%~~ 15%

D = 15~~14~~ - 25%
E = 25~~+%~~ - 45%

Amend §11-0408 (Soils of the County) of the Public Facilities Manual by deleting Table 11.2.

~~**TABLE 11.2**~~
~~**EROSION (LONG TERM) SYMBOLS**~~
~~+ = Soil accumulation~~
~~0 = No erosion~~
~~1 = Slight erosion~~
~~2 = Moderate erosion~~
~~3 = Severe erosion~~

Amend §11-0408 (Soils of the County) of the Public Facilities Manual by renumbering and revising Table 11.3 to read as follows:

TABLE 11.2 ~~11.3~~
NUMERICAL INDEX COUNTY SOILS

~~1 Mixed alluvial land~~
~~2 Chewacla silt loam~~
~~3 Congaree silt loam~~
~~5 Wedhadkee silt loam~~
~~6+ Hyattsville fine sandy loam~~
~~6B+ Hyattsville fine sandy loam~~
~~8+ Worsham silt loam~~
~~8B+ Worsham silt loam~~
~~8A1 Worsham silt loam~~
~~8B1 Worsham silt loam~~
~~8A+ Worsham silt loam~~
~~10B Glenville silt loam~~
~~11 Bermudian silt loam~~
~~12 Rowland silt loam~~
~~13 Bowmansville silt loam~~
~~14B Manassas silt loam~~
~~15 Muck~~
~~18B Rocky land (acidic rock) undulating~~
~~18C Rocky land (acidic rock) rolling phase~~
~~18D Rocky land (acidic rock) hilly phase~~
~~18E Rocky land (acidic rock) steep phase~~
~~19C Very rocky land (acidic rock) rolling phase~~
~~19D Very rocky land (acidic rock) hilly phase~~
~~19E Very rocky land (acidic rock) steep phase~~
~~20B Meadowville silt loam~~
~~21C1 Manor silt loam, rolling phase~~

~~21C2 Manor silt loam, rolling phase~~
~~21C3 Manor silt loam, eroded rolling phase~~
~~21D1 Manor silt loam, hilly phase~~
~~21D2 Manor silt loam, hilly phase~~
~~21D3 Manor silt loam, eroded hilly phase~~
~~21E2 Manor silt loam, steep phase~~
~~21E3 Manor silt loam, eroded steep phase~~
~~22B2 Chillum gravelly silt loam~~
~~23B1 Captina silt loam, undulating phase~~
~~23B2 Captina silt loam, undulating phase~~
~~23C1 Captina silt loam, rolling phase~~
~~24B1 Elioak silt loam, undulating phase~~
~~24B2 Elioak silt loam, undulating phase~~
~~24B3 Elioak silt loam, eroded undulating phase~~
~~24C1 Elioak silt loam, rolling phase~~
~~24C2 Elioak silt loam, rolling phase~~
~~24C3 Elioak silt loam, eroded rolling phase~~
~~24D1 Elioak silt loam, hilly phase~~
~~24D2 Elioak silt loam, hilly phase~~
~~24D3 Elioak silt loam, eroded hilly phase~~
~~25 Sequatchie silt loam~~
~~26 Bertie silt loam~~
~~27B2 Ruxton silt loam, undulating phase~~
~~27C2 Ruxton silt loam, rolling phase~~
~~27D2 Ruxton silt loam, hilly phase~~
~~28B1 Montalto silt loam, undulating phase~~
~~28B2 Montalto silt loam, undulating phase~~
~~28C1 Montalto silt loam, rolling phase~~
~~28C2 Montalto silt loam, rolling phase~~
~~28C3 Montalto silt loam, eroded rolling phase~~
~~29B2 Ruxton stony silt loam, undulating phase~~
~~29C2 Ruxton stony silt loam, rolling phase~~
~~29D2 Ruxton stony silt loam, hilly phase~~
~~30 Huntington silt loam~~
~~31 Lindside silt loam~~
~~32B1 Fairfax silt loam, undulating phase~~
~~32B2 Fairfax silt loam, undulating phase~~
~~32B3 Fairfax silt loam, eroded undulating phase~~
~~32C1 Fairfax silt loam, rolling phase~~
~~32C2 Fairfax silt loam, rolling phase~~
~~32C3 Fairfax silt loam, eroded rolling phase~~
~~33 Melvin silt loam~~
~~34 Woodstown fine sandy loam, nearly level phase~~
~~34B1 Woodstown fine sandy loam, undulating phase~~
~~34B2 Woodstown fine sandy loam, undulating phase~~
~~34C1 Woodstown fine sandy loam, rolling phase~~

~~34C2 Woodstown fine sandy loam, rolling phase~~
~~35C1 Manteo shaly silt loam, rolling phase~~
~~35C2 Manteo shaly silt loam, rolling phase~~
~~35C3 Manteo shaly silt loam, eroded rolling phase~~
~~35D2 Manteo shaly silt loam, hilly phase~~
~~35D3 Manteo shaly silt loam, eroded hilly phase~~
~~36B1 Brays silt loam, undulating phase~~
~~36B2 Brays silt loam, undulating phase~~
~~36C2 Brays silt loam, rolling phase~~
~~36C3 Brays silt loam, eroded rolling phase~~
~~36D3 Brays silt loam, eroded hilly phase~~
~~37B1 Beltsville silt loam, undulating phase~~
~~37B2 Beltsville silt loam, undulating phase~~
~~37C2 Beltsville silt loam, rolling phase~~
~~38B1 Beltsville loam, undulating phase~~
~~38B2 Beltsville loam, undulating phase~~
~~39 Othello silt loam~~
~~40B1 Mecklenburg silt loam, undulating phase~~
~~40B2 Mecklenburg silt loam, undulating phase~~
~~40C1 Mecklenburg silt loam, rolling phase~~
~~40C2 Mecklenburg silt loam, rolling phase~~
~~41B Rocky land (basic rock) undulating phase~~
~~41C Rocky land (basic rock) rolling phase~~
~~41D Rocky land (basic rock) hilly phase~~
~~42B Very rocky land (basic rock) undulating phase~~
~~42C Very rocky land (basic rock) rolling phase~~
~~42D Very rocky land (basic rock) hilly phase~~
~~43B1 Masada gravelly loam, undulating phase~~
~~43B2 Masada gravelly loam, undulating phase~~
~~43C1 Masada gravelly loam, rolling phase~~
~~43C2 Masada gravelly loam, rolling phase~~
~~43D2 Masada gravelly loam, hilly phase~~
~~44B3 Caroline silt loam, eroded undulating phase~~
~~44C3 Caroline silt loam, eroded rolling phase~~
~~45 Matapeake silt loam, nearly level phase~~
~~45B1 Matapeake silt loam, undulating phase~~
~~45B2 Matapeake silt loam, undulating phase~~
~~45C2 Matapeake silt loam, rolling phase~~
~~46 Mattapex silt loam, nearly level phase~~
~~46B1 Mattapex silt loam, undulating phase~~
~~46B2 Mattapex silt loam, undulating phase~~
~~46C1 Mattapex silt loam, rolling phase~~
~~46C2 Mattapex silt loam, rolling phase~~
~~47 Dragston fine sandy loam~~
~~48A1 Iredell silt loam, nearly level phase~~
~~48B1 Iredell silt loam, undulating phase~~

~~48B2—Iredell silt loam, undulating phase~~
~~49B1—Lunt fine sandy loam, undulating phase~~
~~49B2—Lunt fine sandy loam, undulating phase~~
~~49C1—Lunt fine sandy loam, rolling phase~~
~~49C2—Lunt fine sandy loam, rolling phase~~
~~49C3—Lunt fine sandy loam, eroded rolling phase~~
~~49D2—Lunt fine sandy loam, hilly phase~~
~~50B1—Iredell-Mecklenburg stony silt loams, undulating phase~~
~~50B2—Iredell-Mecklenburg stony silt loams, undulating phase~~
~~50C1—Iredell-Mecklenburg stony silt loams, rolling phase~~
~~50C2—Iredell-Mecklenburg stony silt loams, rolling phase~~
~~51——Keyport silt loams~~
~~52A+—Elbert silt loam, nearly level phase~~
~~52A1—Elbert silt loam, nearly level phase~~
~~52B+—Elbert silt loam, undulating phase~~
~~52B1—Elbert silt loam, undulating phase~~
~~53——Lenoir silt loam~~
~~54——Sassafras fine sandy loam, nearly level phase~~
~~54B1—Sassafras fine sandy loam, undulating phase~~
~~54B2—Sassafras fine sandy loam, undulating phase~~
~~54C1—Sassafras fine sandy loam, rolling phase~~
~~54C2—Sassafras fine sandy loam, rolling phase~~
~~55B1—Glenelg silt loam, undulating phase~~
~~55B2—Glenelg silt loam, undulating phase~~
~~55C1—Glenelg silt loam, rolling phase~~
~~55C2—Glenelg silt loam, rolling phase~~
~~55C3—Glenelg silt loam, eroded rolling phase~~
~~55D1—Glenelg silt loam, hilly phase~~
~~55D2—Glenelg silt loam, hilly phase~~
~~55D3—Glenelg silt loam, eroded hilly phase~~
~~56——Kempsville loam~~
~~57B1—Brecknock loam, undulating phase~~
~~57B2—Brecknock loam, undulating phase~~
~~57C1—Brecknock loam, rolling phase~~
~~57C2—Brecknock loam, rolling phase~~
~~57C3—Brecknock loam, eroded rolling phase~~
~~58A—Susquehanna silt loam~~
~~58B2—Susquehanna silt loam~~
~~59B1—Orange silt loam, undulating phase~~
~~59B2—Orange silt loam, undulating phase~~
~~59B3—Orange silt loam, undulating phase~~
~~59A1—Orange silt loam, nearly level phase~~
~~59C1—Bremo orange silt loam, rolling phase~~
~~59C2—Bremo orange silt loam, rolling phase~~
~~60B1—Appling gritty loam, undulating phase~~
~~60B2—Appling gritty loam, undulating phase~~

~~60C1—Appling gritty loam, rolling phase~~
~~60C2—Appling gritty loam, rolling phase~~
~~60C3—Appling gritty loam, eroded rolling phase~~
~~60D1—Appling gritty loam, hilly phase~~
~~60D2—Appling gritty loam, hilly phase~~
~~60D3—Appling gritty loam, eroded hilly phase~~
~~61C2—Rolling land, loamy and gravelly sediments~~
~~61C3—Rolling land, loamy and gravelly sediments, eroded phase~~
~~61D2—Hilly land, loamy and gravelly sediments~~
~~61D3—Hilly land, loamy and gravelly sediments, eroded phase~~
~~61E2—Steep land, loamy and gravelly sediments~~
~~62B1—Brecknock silt loam, undulating phase~~
~~62B2—Brecknock silt loam, undulating phase~~
~~62C1—Brecknock silt loam, rolling phase~~
~~62C2—Brecknock silt loam, rolling phase~~
~~62C3—Brecknock silt loam, eroded rolling phase~~
~~63C2—Louisburg coarse sandy loam, rolling phase~~
~~63C3—Louisburg coarse sandy loam, eroded rolling phase~~
~~63D2—Louisburg coarse sandy loam, hilly phase~~
~~63E2—Louisburg coarse sandy loam, steep phase~~
~~64B1—Undulating land, loamy sediments~~
~~64B2—Undulating land, loamy sediments, eroded phase~~
~~64C1—Rolling land, loamy sediments~~
~~64C2—Rolling land, loamy sediments, eroded phase~~
~~64D1—Hilly land, loamy sediments~~
~~64D2—Hilly land, loamy sediments, eroded phase~~
~~64E1—Steep land, loamy sediments~~
~~64E2—Steep land, loamy sediments, eroded phase~~
~~65B1—Colfax loam, undulating phase~~
~~65B2—Colfax loam, undulating phase~~
~~65C1—Colfax loam, rolling phase~~
~~65C2—Colfax loam, rolling phase~~
~~66B1—Lloyd loam, undulating phase~~
~~66B2—Lloyd loam, undulating phase~~
~~66C2—Lloyd loam, rolling phase~~
~~66C3—Lloyd loam, eroded rolling phase~~
~~66D2—Lloyd loam, hilly loam~~
~~67B1—Penn fine sandy loam, undulating phase~~
~~67B2—Penn fine sandy loam, undulating phase~~
~~67C1—Penn fine sandy loam, rolling phase~~
~~67C2—Penn fine sandy loam, rolling phase~~
~~67D1—Penn fine sandy loam, hilly phase~~
~~67D2—Penn fine sandy loam, hilly phase~~
~~68A—Roanoke silt loam~~
~~69B2—Enon silt loam, undulating phase~~
~~69C1—Enon silt loam, rolling phase~~

~~69C2 Enon silt loam, rolling phase~~
~~69C3 Enon silt loam, eroded rolling phase~~
~~69D2 Enon silt loam, hilly phase~~
~~70A State fine sandy loam~~
~~71B1 Bucks silt loam, undulating phase~~
~~71B2 Bucks silt loam, undulating phase~~
~~72B1 Bucks loam, undulating phase~~
~~72B2 Bucks loam, undulating phase~~
~~73B1 Penn silt loam, undulating phase~~
~~73B2 Penn silt loam, undulating phase~~
~~73B3 Penn silt loam, eroded undulating phase~~
~~73C1 Penn silt loam, rolling phase~~
~~73C2 Penn silt loam, rolling phase~~
~~73C3 Penn silt loam, eroded rolling phase~~
~~73D2 Penn silt loam, hilly phase~~
~~75B1 Penn loam, undulating phase~~
~~75B2 Penn loam, undulating phase~~
~~75C1 Penn loam, rolling phase~~
~~75C2 Penn loam, rolling phase~~
~~75C3 Penn loam, eroded rolling phase~~
~~75D2 Penn loam, hilly phase~~
~~75D3 Penn loam, eroded hilly phase~~
~~76A+ Calverton loam, nearly level phase~~
~~76A1 Calverton loam, nearly level phase~~
~~76B+ Calverton loam, undulating phase~~
~~76B1 Calverton loam, undulating phase~~
~~76B2 Calverton loam, undulating phase~~
~~76C1 Calverton loam, rolling phase~~
~~77B1 Penn shaly silt loam, undulating phase~~
~~77B2 Penn shaly silt loam, undulating phase~~
~~77B3 Penn shaly silt loam, undulating phase~~
~~77C2 Penn shaly silt loam, rolling phase~~
~~77C3 Penn shaly silt loam, rolling phase~~
~~77D2 Penn shaly silt loam, hilly phase~~
~~77D3 Penn shaly silt loam, hilly phase~~
~~77E2 Penn shaly silt loam, steep phase~~
~~77E3 Penn shaly silt loam, steep phase~~
~~78A+ Calverton silt loam, nearly level phase~~
~~78A1 Calverton silt loam, nearly level phase~~
~~78B+ Calverton silt loam, undulating phase~~
~~78B1 Calverton silt loam, undulating phase~~
~~79B1 Kelly silt loam, undulating phase~~
~~79B2 Kelly silt loam, undulating phase~~
~~80A+ Croton silt loam, nearly level phase~~
~~80A1 Croton silt loam, nearly level phase~~
~~80B+ Croton silt loam, undulating phase~~

~~80B1 Croton silt loam, undulating phase~~
~~83 Galestown loamy fine sand, nearly level phase~~
~~83B1 Galestown loamy fine sand, undulating phase~~
~~84 Fallington fine sandy loam~~
~~85 Elkton silt loam~~
~~86 Klej loamy fine sand~~
~~87B1 Wickham loam~~
~~88B1 Hiwassee silt loam~~
~~88B2 Hiwassee silt loam~~
~~88C1 Hiwassee silt loam~~
~~88C2 Hiwassee silt loam~~
~~89 Tidal Marsh~~
~~90B1 Augusta very fine sandy loam, undulating phase~~
~~90B2 Augusta very fine sandy loam, undulating phase~~
~~90C1 Augusta very fine sandy loam, rolling phase~~
~~90C2 Augusta very fine sandy loam, rolling phase~~
~~90C3 Augusta very fine sandy loam, eroded rolling phase~~
~~91B1 Birdsboro silt loam, undulating phase~~
~~91B2 Birdsboro silt loam, undulating phase~~
~~92B1 Raritan silt loam~~
~~92B2 Raritan silt loam~~
~~104B1 Catlett gravelly silt loam, undulating phase~~
~~104B2 Catlett gravelly silt loam, undulating phase~~
~~104C1 Catlett gravelly silt loam, rolling phase~~
~~104C2 Catlett gravelly silt loam, rolling phase~~
~~104C3 Catlett gravelly silt loam, eroded rolling phase~~
~~104D2 Catlett gravelly silt loam, hilly phase~~
~~104D3 Catlett gravelly silt loam, eroded hilly phase~~
~~110B1 Augusta loam~~
~~112B1 Augusta silt loam~~
~~113B1 Fairfax gravelly silt loam C2,D2~~
~~114 Masada fine sandy loam~~
~~115 Hiwassee fine sandy loam, light surface phase~~
~~116 Chistiana gravelly loam~~
~~118 Marine clay deposits (subject to land slippage)~~
~~120 Altavista fine sandy loam (from coastal plain soils)~~
~~128B1 Montalto stony silt loam, undulating phase~~
~~128B2 Montalto stony silt loam, undulating phase~~
~~128C1 Montalto stony silt loam, rolling phase~~
~~128C2 Montalto stony silt loam, rolling phase~~
~~128C3 Montalto stony silt loam, eroded rolling phase~~
~~129 Montalto rocky silt loam~~
~~132B1 Mayodan silt loam, undulating phase~~
~~132B2 Mayodan silt loam, undulating phase~~
~~132C1 Mayodan silt loam, rolling phase~~
~~132C2 Mayodan silt loam, rolling phase~~

~~141B - Rocky land greenstone~~
~~141C - Rocky land greenstone~~
~~141D - Rocky land greenstone~~
~~142B - Rocky land greenstone~~
~~142C - Rocky land greenstone~~
~~142D - Rocky land greenstone~~
~~146 - Caroline fine sandy loam~~
~~148B1 Iredell-Mecklenburg silt loams, undulating phase~~
~~148B2 Iredell-Mecklenburg silt loams, undulating phase~~
~~148C2 Iredell-Mecklenburg silt loams, rolling phase~~
~~148C3 Iredell-Mecklenburg silt loams, eroded rolling phase~~
~~149B1 Lunt silt loam, undulating phase~~
~~149B2 Lunt silt loam, undulating phase~~
~~149C2 Lunt silt loam, rolling phase~~
~~149C3 Lunt silt loam, eroded rolling phase~~
~~152A+ Elbert orange group~~
~~152A1 Elbert orange group~~
~~152B+ Elbert orange group~~
~~152B1 Elbert orange group~~
~~216 - Hyattsville loam, clayey subsoil varient~~
~~232B1 Fairfax loam, undulating phase~~
~~232B2 Fairfax loam, undulating phase~~
~~273A1 Readington silt loam, nearly level phase~~
~~273B1 Readington silt loam, undulating phase~~
~~273B2 Readington silt loam, undulating phase~~
~~274 - Readington fine sand loam~~

1A, Albano silt loam, 0 to 2 percent slopes
2B, Ashburn silt loam, 2 to 7 percent slopes
3, Barkers Crossroads loam, 0 to 45 percent slopes
4B, Barkers Crossroads-Nathalie complex, 2 to 7 percent slopes
4C, Barkers Crossroads-Nathalie complex, 7 to 15 percent slopes
4D, Barkers Crossroads-Nathalie complex, 15 to 25 percent slopes
5B, Barkers Crossroads-Rhodhiss complex, 2 to 7 percent slopes
5C, Barkers Crossroads-Rhodhiss complex, 7 to 15 percent slopes
5D, Barkers Crossroads-Rhodhiss complex, 15 to 25 percent slopes
5E, Barkers Crossroads-Rhodhiss complex, 25-45 percent slopes
6B, Barkers Crossroads-Rhodhiss-Rock outcrop complex, 2 to 7 percent slopes
6C, Barkers Crossroads-Rhodhiss-Rock outcrop complex, 7 to 15 percent slopes
6D, Barkers Crossroads-Rhodhiss-Rock outcrop complex, 15 to 25 percent slopes
6E, Barkers Crossroads-Rhodhiss-Rock outcrop complex, 25 to 45 percent slopes
7B, Beltsville silt loam, 2 to 7 percent slopes
8A, Bermudian silt loam, 0 to 2 percent slopes occasionally flooded
9B, Birdsboro loam, 2 to 7 percent slopes
10A, Bowmansville silt loam, 0 to 2 percent slopes, occasionally flooded
11B, Catlett gravelly silt loam, 2 to 7 percent slopes

11C, Catlett gravelly silt loam, 7 to 15 percent slopes
11D, Catlett gravelly silt loam, 15 to 25 percent slopes
12, Chantilly loam, 0 to 45 percent slopes
13A, Chantilly-Albano complex, 0 to 2 percent slopes
14B, Chantilly-Ashburn complex, 2 to 7 percent slopes
15A |Chantilly-Bermudian complex, 0 to 2 percent slopes
16B, Chantilly-Birdsboro complex, 2 to 7 percent slopes
17A, Chantilly-Bowmansville complex, 0 to 2 percent slopes
18B, Chantilly-Catlett complex, 2 to 7 percent slopes
18C, Chantilly-Catlett complex, 7 to 15 percent slopes
18D, Chantilly-Catlett complex, 15 to 25 percent slopes
19B, Chantilly-Clover complex, 2 to 7 percent slopes
20B, Chantilly-Delanco complex, 2 to 7 percent slopes
21A, Chantilly-Dulles complex, 0 to 2 percent slopes
21B, Chantilly-Dulles complex, 2 to 7 percent slopes
22B, Chantilly-Manassas complex, 2 to 7 percent slopes
23B, Chantilly-Montalto complex, 2 to 7 percent slopes
23C, Chantilly-Montalto complex, 7 to 15 percent slopes
24D, Chantilly-Nestoria complex, 15 to 25 percent slopes
24E, Chantilly-Nestoria complex, 25 to 45 percent slopes
25B, Chantilly-Penn complex, 2 to 7 percent slopes
25C, Chantilly-Penn complex, 7 to 15 percent slopes
26A, Chantilly-Rowland complex, 0 to 2 percent slopes, frequently flooded
27B, Chantilly-Sycoline-Kelly complex, 2 to 7 percent slopes
27C, Chantilly-Sycoline-Kelly complex, 7 to 15 percent slopes
28B, Clover silt loam, 2 to 7 percent slopes
29A, Codorus silt loam, 0 to 2 percent slopes, occasionally flooded
30A, Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded
31B, Danripple gravelly loam, 2 to 7 percent slopes
31C, Danripple gravelly loam, 7 to 15 percent slopes
32B, Delanco loam, 2 to 7 percent slopes
33A, Downer loamy sand, 0 to 2 percent slopes
34A, Dulles silt loam, 0 to 2 percent slopes
34B, Dulles silt loam, 2 to 7 percent slopes
35A, Elbert silt loam, 0 to 2 percent slopes, frequently flooded
36A, Elkton silt loam, 0 to 2 percent slopes, occasionally ponded
37B, Elsinboro loam, 2 to 7 percent slopes, rarely flooded
38B, Fairfax loam, 2 to 7 percent slopes
38C, Fairfax loam, 7 to 15 percent slopes
38D, Fairfax loam, 15 to 25 percent slopes
39B, Glenelg silt loam, 2 to 7 percent slopes
39C, Glenelg silt loam, 7 to 15 percent slopes
39D, Glenelg silt loam, 15 to 25 percent slopes
39E, Glenelg silt loam, 25 to 45 percent slopes
40, Grist Mill sandy loam, 0 to 25 percent slopes
41A, Grist Mill-Downer complex, 0 to 2 percent slopes

42A, Grist Mill-Elkton complex, 0 to 2 percent slopes
43A, Grist Mill-Gunston complex, 0 to 2 percent slopes
44A, Grist Mill-Honga complex, 0 to 2 percent slopes
45A, Grist Mill-Matapeake complex, 0 to 2 percent slopes
45B, Grist Mill-Matapeake complex, 2 to 7 percent slopes
46A, Grist Mill-Mattapex complex, 0 to 2 percent slopes
46B, Grist Mill-Mattapex complex, 2 to 7 percent slopes
47B, Grist Mill-Woodstown complex, 2 to 7 percent slopes
48A, Gunston silt loam, 0 to 2 percent slopes
49A, Hatboro silt loam, 0 to 2 percent slopes, frequently flooded
50, Hattontown silt loam, 0 to 25 percent slopes
51A, Hattontown-Elbert complex, 0 to 2 percent slopes
52B, Hattontown-Haymarket complex, 2 to 7 percent slopes
52C, Hattontown-Haymarket complex, 7 to 15 percent slopes
53A, Hattontown-Jackland complex, 0 to 2 percent slopes
54B, Hattontown-Jackland-Haymarket complex, 2 to 7 percent slopes
54C |Hattontown-Jackland-Haymarket complex, 7 to 15 percent slopes
55B, Hattontown-Kelly complex, 2 to 7 percent slopes
56B, Hattontown-Orange complex, 2 to 7 percent slopes
57C, Hattontown-Orange complex, 7 to 15 percent slopes, very stony
59B, Haymarket silt loam, 2 to 7 percent slopes
59C, Haymarket silt loam, 7 to 15 percent slopes
60A, Honga peat, 0 to 1 percent slopes, very frequently flooded, tidal
61A, Huntington silt loam, 0 to 2 percent slopes, occasionally flooded
62A, Jackland silt loam, 0 to 2 percent slopes
63B, Jackland and Haymarket soils, 2 to 7 percent slopes
63C, Jackland and Haymarket soils, 7 to 15 percent slopes
64B, Jackland and Haymarket soils, 2 to 7 percent slopes, very stony
64C, Jackland and Haymarket soils, 7 to 15 percent slopes, very stony
64D, Jackland and Haymarket soils, 15 to 25 percent slopes, very stony
65B, Kelly silt loam, 2 to 7 percent slopes
66, Kingstowne sandy clay loam, 0 to 45 percent slopes
67B, Kingstowne-Beltsville complex, 2 to 7 percent slopes
68B, Kingstowne-Danripple complex, 2 to 7 percent slopes
68C, Kingstowne-Danripple complex, 7 to 15 percent slopes
69B, Kingstowne-Elsinboro complex 2 to 7 percent slopes
70A, Kingstowne-Sassafras complex, 0 to 2 percent slopes
70B, Kingstowne-Sassafras complex, 2 to 7 percent slopes
70C, Kingstowne-Sassfrass complex, 7 to 15 percent slopes
71C, Kingstowne-Sassafras-Marumsco complex, 7 to 15 percent slopes
71D, Kingstowne-Sassafras-Marumsco complex, 15 to 25 percent slopes
71E, Kingstowne-Sassafras-Marumsco complex, 25 to 45 percent slopes
72B, Kingstowne-Sassafras-Neabsco complex, 2 to 7 percent slopes
73A, Lindside silt loam, 0 to 2 percent slopes, occasionally flooded
74B, Lunt-Marumsco complex, 2 to 7 percent slopes
75B, Manassas silt loam, 2 to 7 percent slopes

76A, Matapeake silt loam, 0 to 2 percent slopes
76B, Matapeake silt loam, 2 to 7 percent slopes
77A, Mattapex loam, 0 to 2 percent slopes
77B, Mattapex loam, 2 to 7 percent slopes
78B, Meadowville loam, 2 to 7 percent slopes
79B, Nathalie gravelly loam, 2 to 7 percent slopes
79C, Nathalie gravelly loam, 7 to 15 percent slopes
79D, Nathalie gravelly loam, 15 to 25 percent slopes
80D, Nestoria channery silt loam, 15 to 25 percent slopes
80E, Nestoria channery silt loam, 25 to 45 percent slopes
81B, Oatlands loam, 2 to 7 percent slopes
81C, Oatlands loam, 7 to 15 percent slopes
82B, Orange silt loam, 2 to 7 percent slopes
83C, Orange silt loam, 7 to 15 percent slopes, very stony
84B, Panorama loam, 2 to 7 percent slopes
85B, Penn silt loam, 2 to 7 percent slopes
85C, Penn silt loam, 7 to 15 percent slopes
86, Pits, gravel
87C, Rhodhiss sandy loam, 7 to 15 percent slopes
87D, Rhodhiss sandy loam, 15 to 25 percent slopes
87E, Rhodhiss sandy loam, 25 to 45 percent slopes
88C, Rhodhiss-Rock outcrop complex, 2 to 15 percent slopes
88D, Rhodhiss-Rock outcrop complex, 15 to 25 percent slopes
88E, Rhodhiss-Rock outcrop complex, 25 to 45 percent slopes
89A, Rowland silt loam, 0 to 2 percent slopes, frequently flooded
90A, Sassafras sandy loam, 0 to 2 percent slopes
90B, Sassafras sandy loam, 2 to 7 percent slopes
90C, Sassafras sandy loam, 7 to 15 percent slopes
91C, Sassafras-Marumsco complex, 7 to 15 percent slopes
91D, Sassafras-Marumsco complex, 15 to 25 percent slopes
91E, Sassafras-Marumsco complex, 25 to 45 percent slopes
92B, Sassafras-Neabsco complex, 2 to 7 percent slopes
93B, Sumerduck loam, 2 to 7 percent slopes
94B, Sycoline-Kelly complex, 2 to 7 percent slopes
94C, Sycoline-Kelly complex, 7 to 15 percent slopes
95, Urban land
96, Urban land-Barker Crossroads complex
97, Urban land-Chantilly complex
98, Urban land-Grist Mill
99, Urban land-Hattontown complex
100, Urban land-Kingstowne complex
101, Urban land-Wheaton complex
102, Wheaton loam, 2 to 25 percent slopes
103A, Wheaton-Codorus complex, 0 to 2 percent slopes
104B, Wheaton-Fairfax complex, 2 to 7 percent slopes
104C, Wheaton-Fairfax complex, 7 to 15 percent slopes

104D, Wheaton-Fairfax complex, 15 to 25 percent slopes
104E, Wheaton-Fairfax complex, 25 to 45 percent slopes
105B, Wheaton-Glenelg complex, 2 to 7 percent slopes
105C, Wheaton-Glenelg complex, 7 to 15 percent slopes
105D, Wheaton-Glenelg complex, 15 to 25 percent slopes
106A, Wheaton-Hatboro complex, 0 to 2 percent slopes, frequently flooded
107B, Wheaton-Meadowville complex, 2 to 7 percent slopes
108B, Wheaton-Sumerduck complex, 2 to 7 percent slopes
109B, Woodstown sandy loam, 2 to 7 percent slopes W, Water

Amend §11-0409 (Soil Profile and Test Data) of the Public Facilities Manual by deleting it in its entirety.

~~11-0409 Soil Profile and Test Data - See Plates 5-11 (5M-11) thru 9-11 (9M-11).~~

Amend §11-0410 (Reserved) of the Public Facilities Manual by deleting it in its entirety.

~~11-0410(RESERVED)~~

Amend §11-0411 (Biotechnical Slope and Bank Protection) of the Public Facilities Manual by renumbering paragraphs 11-0411.1, 11-0411.2, 11-0411.3, 11-0411.4, 11-0411.5, and 11-0411.6, and 11-0411.7 to read as follows:

11-~~0411~~ 0409 Biotechnical Slope and Bank Protection

11-~~0411.1~~ 0409.1 Conditions in the County have resulted in numerous eroded or unstable banks. Some soils are difficult to stabilize on steep slopes after they are disturbed by construction activities. Also conversion of watersheds to urban uses has increased storm run-off and enlarged, deepened and eroded many stream channels.

11-~~0411.2~~ 0409.2 Cost and aesthetic concerns make it desirable to consider vegetative measures as an alternative to conventional structural solutions to these problems. Biotechnical slope and bank protection is one alternative which warrants consideration on an experimental basis, case by case, with the advance approval of DPWES.

11-~~0411.3~~ 0409.3 Biotechnical slope and bank protection consists of the use of natural materials to stabilize stream banks and other unstable or eroding slopes. Dormant wood vegetative materials which grow from cuttings are combined with natural materials such as stone and wood in an integrated, complementary manner.

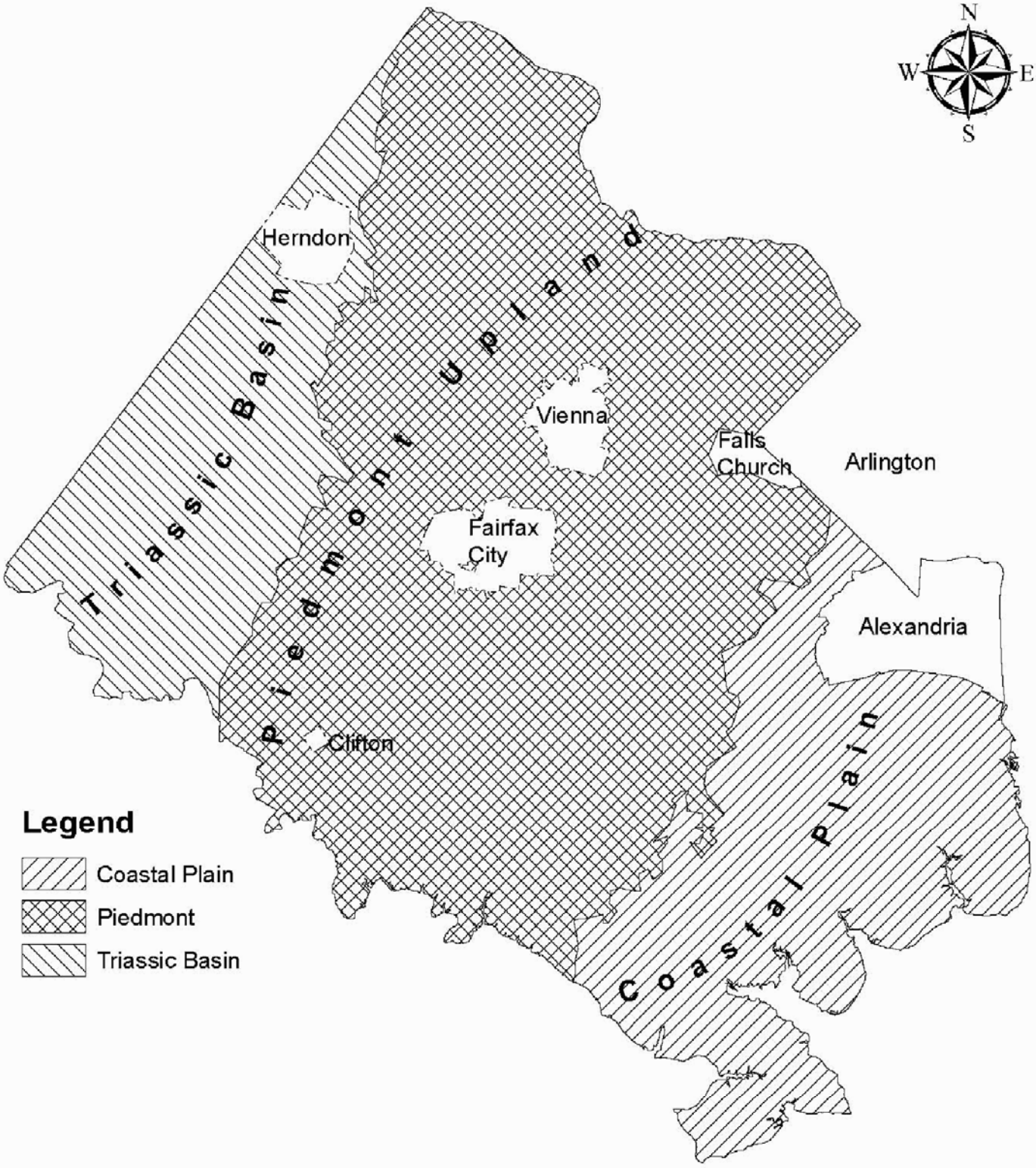
11-~~0411.4~~ 0409.4 When the cuttings root and grow, they produce a mass of leafy vegetation protecting the soil surface and a dense mat of roots which bind the sub-soil to prevent caving, sloughing, and erosion.

11-~~0411.5~~ 0409.5 The plant materials may be combined with riprap, crib walls and other combinations to meet the needs of each site. Such structures are flexible, tend to move with the dynamics of the site, and are self-repairing.

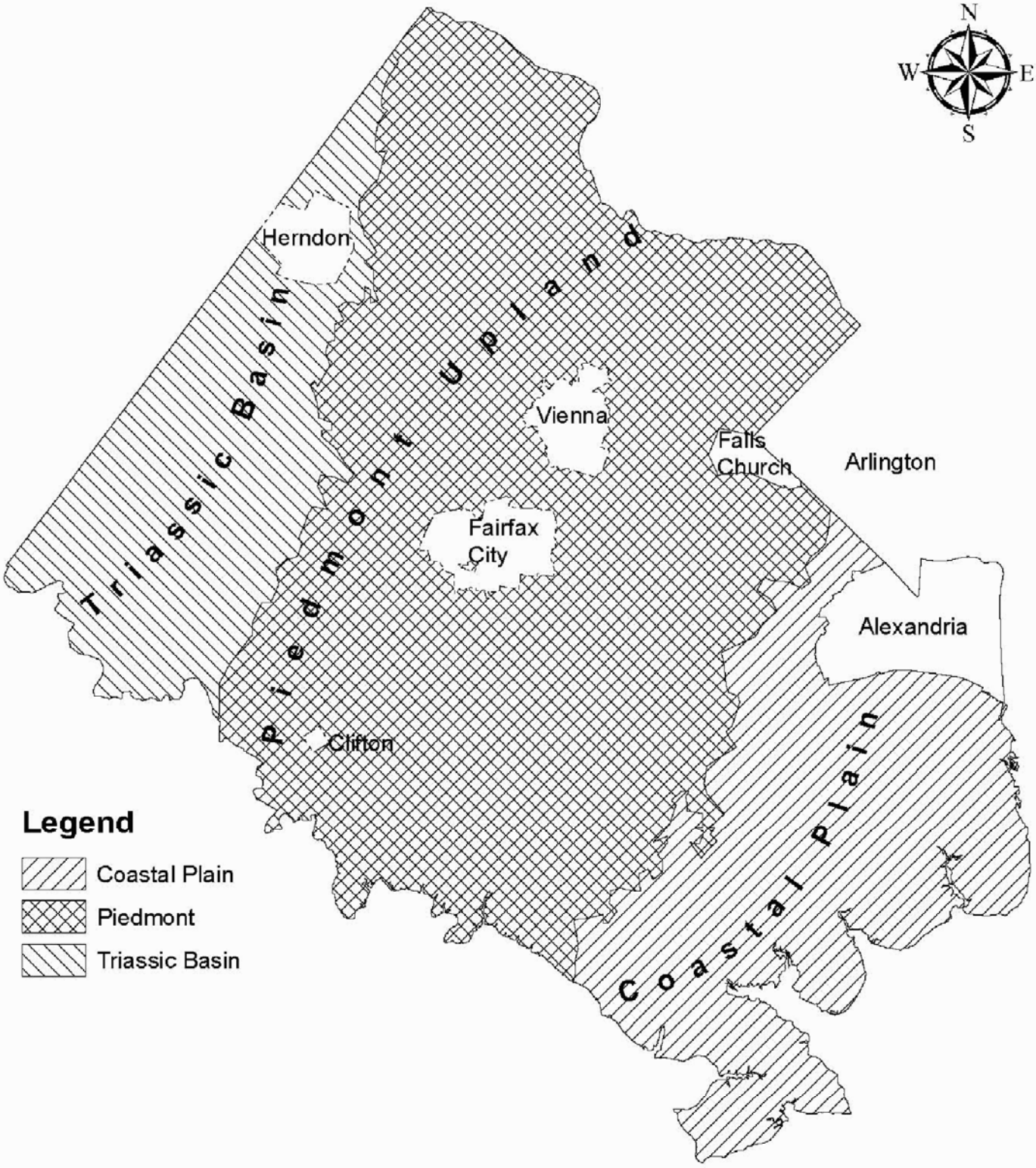
11-~~0411.6~~ 0409.6 Descriptions of biotechnical treatment may be found in the Virginia E&S Control Hand-book. Diagrams showing some forms of biotechnical slope and bank protection are shown in Plate 10-11 (10M-11).

11-~~0411.7~~ 0409.7 As bioengineering stabilization techniques call for coordination of plant science, soils science and engineering principles, they should be employed only with the guidance of experts familiar with bioengineering work. Approval of the Director is required.

Amend Chapter 11 by deleting Plate Nos. 3-11 & 3M-11 (General Soil Map-Fairfax County), Plate Nos. 6-11 & 6M-11 (Engineering Test Data), Plate Nos. 7-11 & 7M-11 (Engineering Test Data), Plate Nos. 8-11 & 8M-11 (Engineering Test Data), and Plate Nos. 9-11 & 9M-11 (Engineering Test Data), adding new Plate No. 3-11 (Physiographic Provinces Fairfax County, Virginia), replacing all of the information in Plate Nos. 4-11 & 4M-11 (Symbols Shown on Soils Maps of Fairfax County), and renumbering the subsequent plates as needed.



Ref. Sec. 11-0408.2	PHYSIOGRAPHIC PROVINCES FAIRFAX COUNTY, VIRGINIA	PLATE NO.	STD. NO.
Rev. X-XX		3-11	



Ref. Sec. 11-0408.2	PHYSIOGRAPHIC PROVINCES FAIRFAX COUNTY, VIRGINIA	PLATE NO.	STD. NO.
Rev. X-XX		3M-11	

-SOIL NUMBER -- GLENELG SILT LOAM.....39B
-SLOPE -- 2 TO 7 PERCENT.....39B - B
SLOPE
0-2 PERCENT.....A
2-7 PERCENT .....B
7-15 PERCENT.....C
15-25 PERCENT.....D
25-45 PERCENT.....E

Soil Lines

Soil survey maps are to be used for general planning purposes only. Please be aware that soil lines are not definitve. Soils gradually phase into one another and characteristics of neighboring soil types will be found within a soil's borders

Marumsco Soils

Marumsco soils are mapped in complexes with other soil types. The complexes are highly variable and consist of combinations of clays, silts, sands and gravels. They may also be problematic. In steep areas that contain clays known as "marine clays," slope stability can be a problem. In addition, structures constructed on clays found in this complex could suffer foundation distress if adequate precautions are not taken during design and construction.

Previously Mapped Marine Clay

These areas were mapped as marine clays in previous soil surveys. Marine clays are high shrink-swell soils that can cause foundation distress. They are sometimes refered to as Potomac Clays or Deltaic Clays.

Non-Marine Clay High Shrink-Swell Soils

Soils containing other shrinking-swelling clays that can lead to foundation distress if precautions are not taken during design and construction

Potential Asbestos Containing Soils

These soils are mapped over naturally asbestos-containing bedrock. Safety precautions must be taken during construction. Orange soils, which overlie a majority of this geology, also contain shrinking-swelling clays which can cause foundation distress.


Landfill


Quarry

Ref. Sec. 11-0408.11 Rev. X-XX	SYMBOLS SHOWN ON SOIL MAPS OF FAIRFAX COUNTY	PLATE NO 4-11	STD NO

-SOIL NUMBER -- GLENELG SILT LOAM.....39B
-SLOPE -- 2 TO 7 PERCENT.....39B - B
SLOPE
0-2 PERCENT.....A
2-7 PERCENT .....B
7-15 PERCENT.....C
15-25 PERCENT.....D
25-45 PERCENT.....E

Soil Lines

Soil survey maps are to be used for general planning purposes only. Please be aware that soil lines are not definitve. Soils gradually phase into one another and characteristics of neighboring soil types will be found within a soil's borders

Marumsco Soils

Marumsco soils are mapped in complexes with other soil types. The complexes are highly variable and consist of combinations of clays, silts, sands and gravels. They may also be problematic. In steep areas that contain clays known as "marine clays," slope stability can be a problem. In addition, structures constructed on clays found in this complex could suffer foundation distress if adequate precautions are not taken during design and construction.

Previously Mapped Marine Clay

These areas were mapped as marine clays in previous soil surveys. Marine clays are high shrink-swell soils that can cause foundation distress. They are sometimes refered to as Potomac Clays or Deltaic Clays.

Non-Marine Clay High Shrink-Swell Soils

Soils containing other shrinking-swelling clays that can lead to foundation distress if precautions are not taken during design and construction

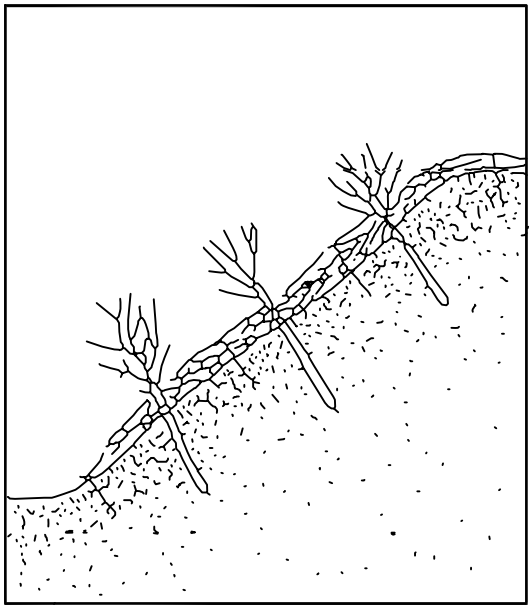
Potential Asbestos Containing Soils

These soils are mapped over naturally asbestos-containing bedrock. Safety precautions must be taken during construction. Orange soils, which overlie a majority of this geology, also contain shrinking-swelling clays which can cause foundation distress.

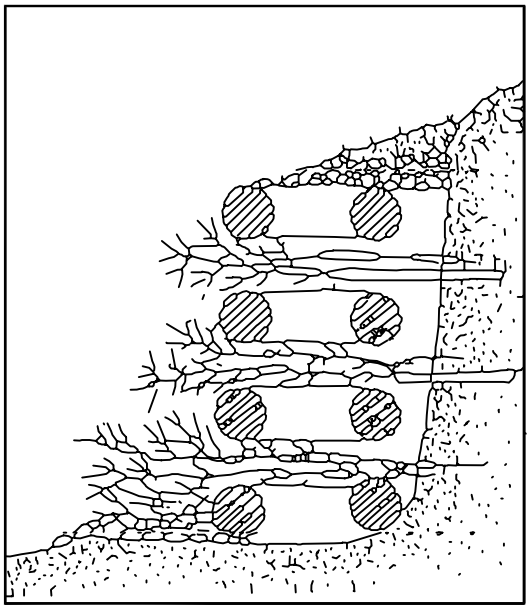
Landfill

Quarry

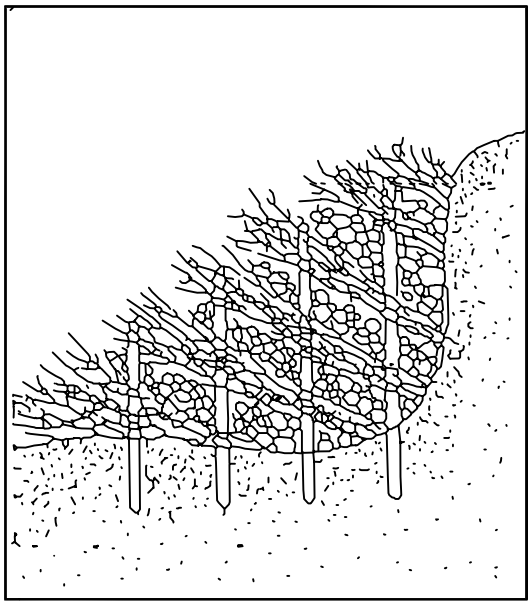
Ref. Sec. 11-0408.11 Rev. X-XX	SYMBOLS SHOWN ON SOIL MAPS OF FAIRFAX COUNTY	PLATE NO 4M-11	STD NO



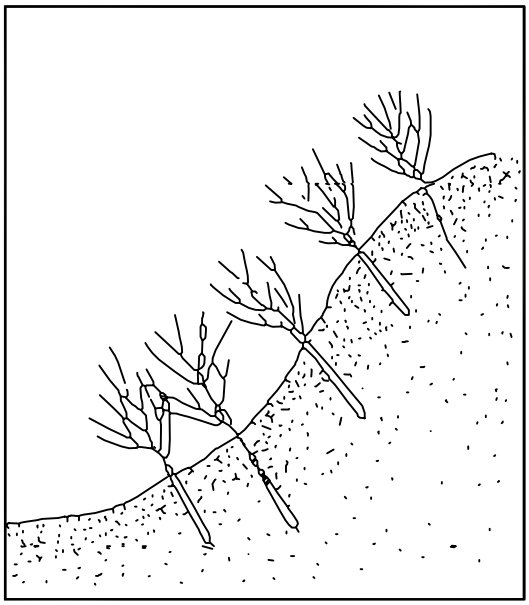
BRUSH MATTRESS



LIVE CRIB WALL



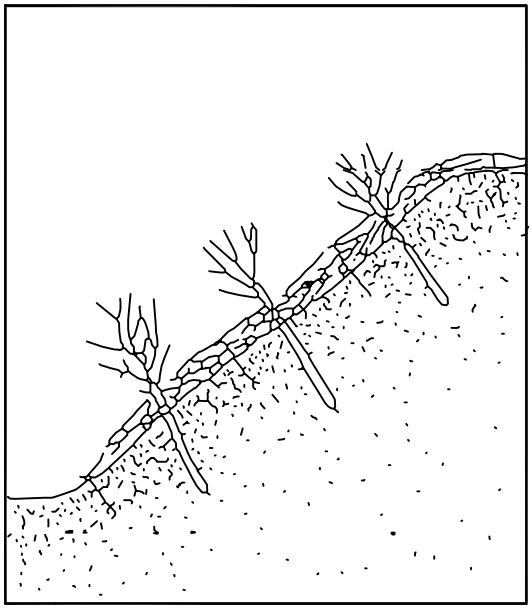
BRUSH LAYERING



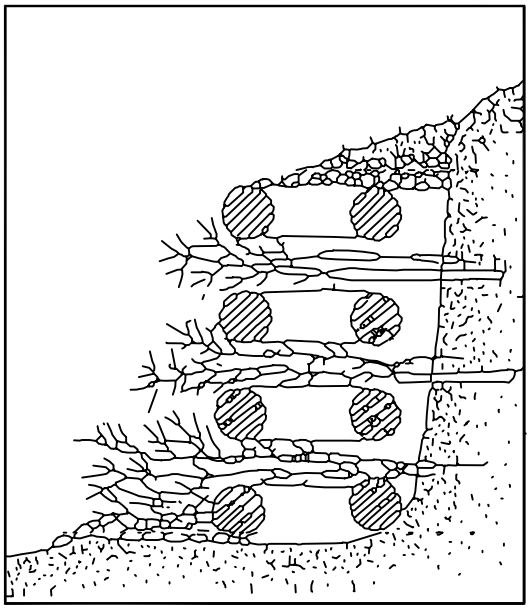
LIVE STAKES

Source: Erosion and Improvement Plan for Stream Valley Parks -- Fairfax County
Gauthier, Alvarado & Associates/Sheladia Associates

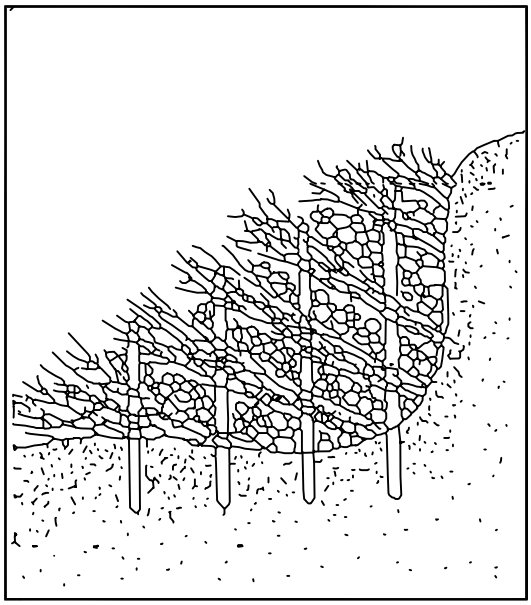
Ref. Sec. 11-0409.6 Rev. X-XX	BIOTECHNICAL SLOPE PROTECTION	PLATE NO.	STD. NO.
		6-11	



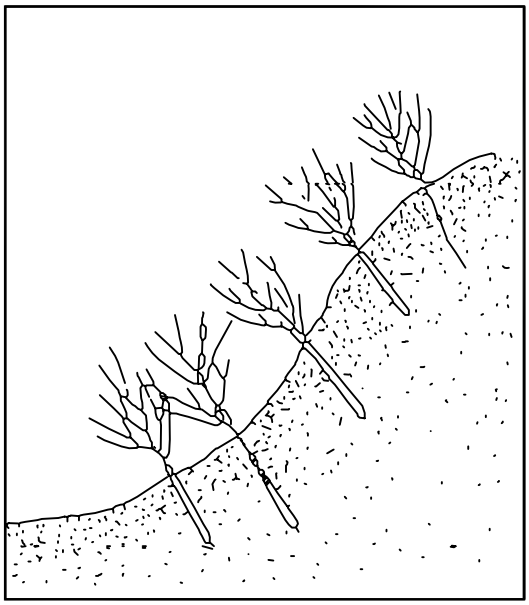
BRUSH MATTRESS



LIVE CRIB WALL



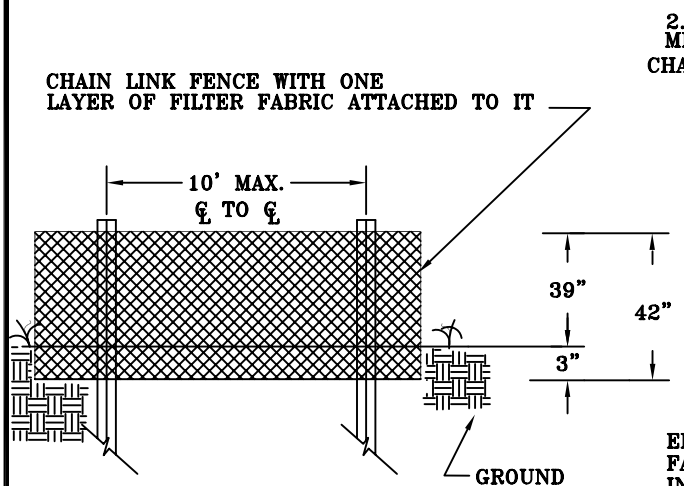
BRUSH LAYERING



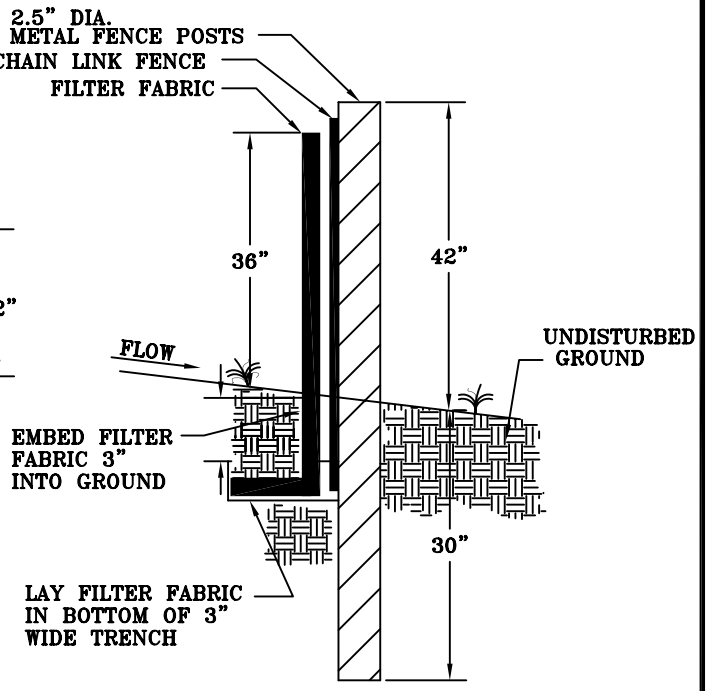
LIVE STAKES

Source: Erosion and Improvement Plan for Stream Valley Parks -- Fairfax County
Gauthier, Alvarado & Associates/Sheladia Associates

Ref. Sec. 11-0409.6 Rev. X-XX	BIOTECHNICAL SLOPE PROTECTION	PLATE NO.	STD. NO.
		6M-11	



ELEVATION VIEW



SSF X——X——X——X——X

SECTION VIEW

SUPER SILT FENCE
NO SCALE

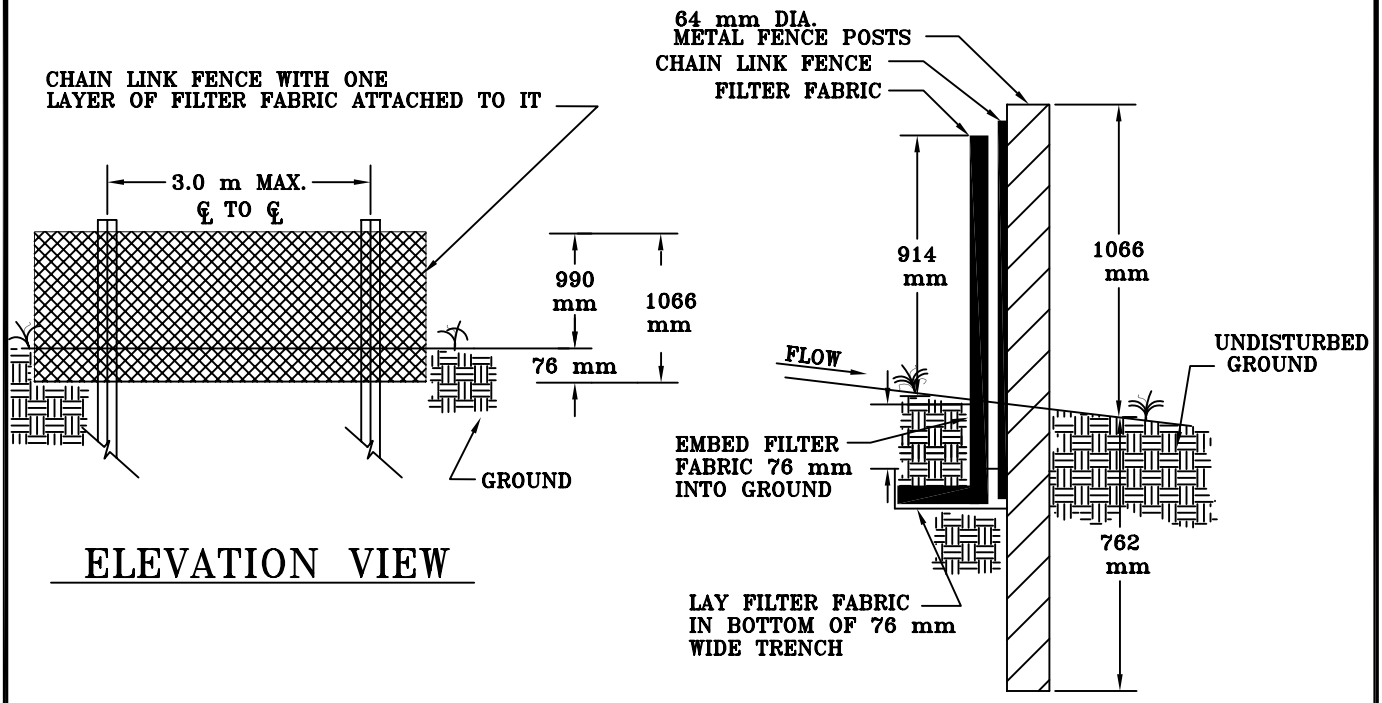
FENCING

Chain link fence shall be 39" above grade with 3" embedded for a total fabric width of 42". The post shall be 42" above grade with 30" placed below grade (without concrete) for a total length of 72".

NOTES

1. Chain link fence shall be fastened securely to fence posts with wire ties.
2. Filter fabric shall be fastened securely to chain link fence with ties spaced horizontally 24" at the top and midsection.
3. Physical properties of the filter fabric shall conform to the latest edition of THE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK.
4. When two sections of filter fabric adjoin each other, they shall be overlapped by 6".
5. Maintenance shall be performed as needed and material shall be removed when sediment build-up reaches 50% of the height of the super silt fence.

Ref. Sec. 11-0110.3J Rev. X-XX	SUPER SILT FENCE NO SCALE	PLATE NO.	STD. NO.
		7-11	



SUPER SILT FENCE
NO SCALE

FENCING

Chain link fence shall be 990 mm above grade with 76 mm embedded for a total fabric width of 1066 mm. The post shall be 1066 mm above grade with 762 mm placed below grade (without concrete) for a total length of 1828 mm.

NOTES

1. Chain link fence shall be fastened securely to fence posts with wire ties.
2. Filter fabric shall be fastened securely to chain link fence with ties spaced horizontally 610 mm at the top and midsection.
3. Physical properties of the filter fabric shall conform to the latest edition of THE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK.
4. When two sections of filter fabric adjoin each other, they shall be overlapped by 152 mm.
5. Maintenance shall be performed as needed and material shall be removed when sediment build-up reaches 50% of the height of the super silt fence.

Note: All units are in mm unless otherwise noted.

Ref. Sec. 11-0110.3J	SUPER SILT FENCE NO SCALE	PLATE NO.	STD. NO.
Rev. X-XX		7M-11	

SOIL Series	No	PARENT MATERIAL	POSITION FROM GROUND SURFACE Depth	Horizon	MOISTURE DENSITY Max. Dry Density	Optimum Moisture	GRAIN SIZE DISTRIBUTION % Passing Sieve 3"	No. 4 (4.76mm)	No. 10 (2.0mm)	No. 40 (.42mm)	No. 200 (.74mm)	% Smaller Than .05 mm	.02 mm	.005 mm	.002		PI	CLASSIFICATION AASHTO	Unified
Appling	60	Granite gneiss	1–17 12–20 32–40	C	116 106 106	12 18 18	100 100	100 99 98	98 93 89	86 82 76	59 64 65	56 61 52	44 56 43	21 [illegible]	14 39 25	22 54 54	3 26 20	A–4(5) A–7–6(14) A–7–5(9)	MH–CH MH
Augusta [2]	90	Alluvial deposits (low river terrace)	0–8 8–50 50–57	A B C	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	25 63 26	5 35 10	A–4 A–7–6 A–2–5	ML MH–CH CG
Beltsville	38	Sand, silt and clay of the Coastal Plain	0–8 8–19	Ap A3,B21,B22 Bm1 Bm2 C1	116 116 125 117 113	13 10 14 15		100 100 100 100 100	95 98 93 92 94	64 70 52 54 54	46 52 38 44 37	21 34 22 33 29	12 24 15 27 26	20 30 17 30 32	2 12 4 11 12	A–4(6) A–6(8) A–4(3) A–6(4) A–6(2)	ML CL ML–CL CL SC
Bertie [3]	26	Coastal Plain sediments	0–8 8–30 35–45	A1 B C	102 117 109	15 13 14		92	91 100 100	95 97	67 80 54	72 83 73	--- --- ---	8 27 12	6 27 11	NP 29 22	NP 13 3	A–4(8) A–6(9) A–4(8)	ML CL ML
Brecknock (loam) [4]	57	Baked gray Triassic sand-stone and shale	2–9 9–18 18–24	A B C	111 115 107	16 15 17												A–4(6) A–6, A–7 A–6	ML–CL CL
Brecknock (silt loam) [4]	62	Baked gray Triassic shale	2–9 9–18 18–24	Ap B2 C	111 115 107	16 15 17	100	92	85 95 97	67 80 54	51 62 52	21 31 9	16 23 16	26 25 25	5 7 NP	A–4(6) A–4(8) A–4(4)	ML–CL ML–CL ML
Bucks (loam) [4]	72	Red Triassic sandstone	0–9 9–19 19–54 54–74	Ap B2 B3 C2	116 116 114 107	13 14 15 19			100 100 100 100	96 97 97	60 62 52 88	35 43 34 63	23 29 23 35	23 29 28 38	3 9 7 11	A–4(5) A–4(5) A–4(3) A–6(8)	ML CL–ML ML–CL ML
Bucks (silt loam) [4]	71	Red Triassic shale	0–8 8–55	Ap B2,B3	111 101	16 22		100	95 100	86 96	97	81 95	59 77	31 53	23 41	32 54	9 24	A–4(8) A–7–5(8)	ML–CL MH–CH
Calverton	78	Red Triassic shale	0–9 9–24 24–30 30–37	Ap B21,B22 B2m C	104 102 97 100	23 26 23		100 74	100 100 98 52	97 98 93 48	95 97 91 45	90 90 44	73 82 81	37 57 63 30	24 44 51 23	33 60 58 48	8 23 28 22	A–4(8) A–7–6(15) A–7–5(19) A–7–6(6)	ML–CL ML–CL MH–CH SM–SC
Catlett [2]	104	Bake gray Triassic shale	0–11 11–20	A C	--- ---	--- ---	---	---	---	---	---	---	---	---	---	26 30	4 10	A–4 A–4, A–6	ML–CL ML–CL
Chewacla	2	Alluvium	2–17 17–48	Lo[illegible] 2	94 102	25 22			100 100	98 98	87 85	---	---	39	---	46 48	15 18	A–7–5(11) A–7–5(13)	ML ML
Colfax [3]	65	Granite and granite gneiss	7–14 14–18 18–32+	A B Bm C	122 115 113 113	10 14 15 15			100 100 100 100	76 80 83 70	52 58 60 47	45 54 54 42	---	16 30 32 25	---	18 33 34 31	2 13 14 10	A–4(3) A–6(6) A–6(7) A–4(2)	ML CL CL SC
Croton [2]	80	Red, brown, gray Triassic shale	0–10 10–22 22+	A B R	--- --- ---	--- --- ---	---	---	---	---	---	---	---	---	---	[illegible]	8 34 [illegible]	A–4 A–7–6 A–2–4	ML–CL MH CM–CC
Elbert	52	Diabase	0–5 5–10 10–20 20–32 32–36	Ap B2m B3m C	106 106 88 96 107	19 18 29 25 20		100 100	97 96 100 100 97	90 89 99 93 78	83 82 91 67 46	81 79 89 62 40	68 40 82 50 29	45 44 70 41 24	32 30 62 34 17	40 40 94 57 40	18 18 60 29 15	A–6(11) A–6(11) A–7–5(20) A–7–5(17) A–6	CL CL CL MH–CH SM–SC

continue to the next page

Ref. Sec. 11-0409

Rev. 1-00

ENGINEERING TEST DATA [1]

PLATE NO. 6-11

STD. NO.

SOIL Series	No	PARENT MATERIAL	POSITION FROM GROUND SURFACE Depth (mm)	Horizon	MOISTURE DENSITY Max. Dry Density	Optimum Moisture	GRAIN SIZE DISTRIBUTION % Passing Sieve 76.2 mm	4.75 mm	2.0 mm	.425 mm	.075 mm	% Smaller Than .05 mm	.02 mm	.005 mm	.002	LL	PI	CLASSIFICATION AASHTO	Unified
Appling	60	Granite gneiss	25–432 305–508 813–1016	A B C	116 106 106	12 18 18	100 100	100 99 98	98 93 89	86 82 76	59 64 65	56 61 52	44 56 43	21 39 25	14 39 25	22 54 54	3 26 20	A–4(5) A–7–6(14) A–7–5(9)	ML MH–CH MH
Augusta [2]	90	Alluvial deposits (low river terrace)	0–203 203–1270 1270–1448	A B C	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	25 63 26	5 35 10	A–4 A–7–6 A–2–5	ML MH–CH CG
Beltsville	38	Sand, silt and clay of the Coastal Plain	0–203 203–483	Ap A3,B21,B22 Bm1 Bm2 C1	116 116 125 117 113	13 14 15		100 100 100 100 100	95 98 93 92 94	64 70 52 54 54	48 51 41	72 83 73	--- --- --- --- ---	46 52 38 44 37	21 34 22 33 29	12 24 15 27 26	2 12 4 11 12	A–4(6) A–6(8) A–4(3) A–6(4) A–6(2)	ML CL ML–CL CL SC
Bertie [3]	26	Coastal Plain sediments	0–203 203–762 889–1143	A1 B C	102 117 109	15 13 14			100 100 100	96 88	67 80 54	--- --- ---	--- --- ---	8 27 12	6 27 11	NP 29 22	NP 13 3	A–4(8) A–6(9) A–4(8)	ML CL ML
Brecknock (loam) [4]	57	Baked gray Triassic sandstone and shale	51–229 229–457 457–610	A B C	111 115 107	16 15 17		92	91 100 100	85 97	67 80 54	--- --- ---	--- --- ---	21 31 9	--- --- ---	26 25 25	5 7 NP	A–4(6) A–4(8) A–4(4)	ML–CL ML ML
Brecknock (silt loam) [4]	62	Baked gray Triassic shale	51–229 229–457 457–610	Ap B2 C	111 115 107	16 15 17	100	92	85 95 97	67 80 54	--- --- ---	--- --- ---	--- --- ---	21 31 9	--- --- ---	26 25 25	5 7 NP	A–4(5) A–6(5) A–4(4)	ML CL–ML ML
Bucks [4] (loam)	72	Red Triassic sandstone	0–229 229–483 483–1372 1372–1880	Ap B2 B3 C2	116 116 114 107	13 14 15 19			100 100 100 100	96 97 97	60 62 52 88	51 55 45 83	35 43 34 63	22 29 23 35	16 23 16 26	23 29 28 38	3 9 7 11	A–4(5) A–4(3) A–6(8)	ML CL–ML ML
Bucks [4] (silt loam)	71	Red Triassic shale	0–203 203–1397	Ap B2,B3	111 101	16 22		100	95 100	86 96	97	81 95	59 77	31 53	23 41	32 54	9 24	A–7–5(8)	MH–CH
Calverton	78	Red Triassic shale	0–229 229–610 610–762 762–940	Ap B21,B22 B2m C	104 102 97 10	23 26 23		100 74	100 98 52	97 98 93 48	95 97 91 45	96 90 44	73 82 81	37 57 63 30	24 44 51 23	33 60 58 48	8 23 28 22	A–4(8) A–7–6(15) A–7–5(19) A–7–6(6)	ML–CL ML–CL MH–CH SM–SC
Catlett [2]	104	Bake gray Triassic shale	0–279 279–508	A C	---	---	---	---	---	---	---	---	---	---	---	---	4 10	A–4 A–4, A–6	ML–CL ML
Chewacle	2	Alluvium	51–432 432–1219	Layer 1 Layer 2	94 102	25 22			100 100	98 98	87 85	---	---	39	---	46 48	15 18	A–7–5(11) A–7–5(13)	ML ML
Colfax [3]	65	Granite and granite gneiss	178–356 356–483 483–813	A B Bm C	122 115 113 113	10 14 15 15			100 100 100 100	76 80 83 70	52 58 60 47	45 54 54 42	---	16 30 32 25	---	18 33 34 31	2 13 14 10	A–4(3) A–6(6) A–6(7) A–4(2)	CL CL SC
Croton [2]	80	Red, brown, gray Triassic shale	0–254 254–559 559+	A B R	---	---	---	---	---	---	---	---	---	---	---	58 28	8 34	A–4 A–7–6 A–2–4	ML–CL CM–CC
Elbert	52	Diabase	0–127 127–254 254–508 508–813 813–914	Ap Ab B2m B3m C	106 106 88 96 107	19 18 29 25 20		100 100	97 96 100 100 97	90 89 89 93 78	83 82 91 67 46	81 79 89 62 40	68 40 82 50 29	45 44 70 41 24	32 30 62 34 17	40 40 94 57 40	17 18 60 29 15	A–6(11) A–6(11) A–5(20) A–6(17)	CL CL CL MH–CH SM–SC

continue to the next page

Ref. Sec. 11-0409

Rev. 1-00

ENGINEERING TEST DATA [1]

PLATE NO. 6M-11

STD. NO.

SOIL Series	No	PARENT MATERIAL	POSITION FROM GROUND SURFACE Depth (in.)	Horizon	MOISTURE DENSITY Max. Dry Density	Optimum Moisture	GRAIN SIZE DISTRIBUTION % Passing Sieve 3"	No. 4 (4.76mm)	No. 10 (2.0mm)	No. 40 (.42mm)	No. 200 (.74mm)	% Smaller Than .05 mm	.02 mm	.005 mm	.002	LL	PI	CLASSIFICATION AASHTO	Unified
Elioak	24	Micaceous schist	0–9 12–35 50–55	A2 B22 C2	106 100 103	17 23 21	100	96 95 76	94 93 70	91 91 66	82 84 50	77 83 45	60 72 34	33 54	21 46 13	30 55 42	6 22 2	A–4(8) A–7–5(16) A–5(3)	ML–CL MH SM
Elkton	85	Sand, silt, and clay of Coastal Plain	4–11 11–39 49–60	A2 B2g C	116	16 15 13				100 100 100	91 92 81	83 84 62	54 64	27 36 17	19 29 15	30 34 23	8 17 6	A–4(8) A–6(11) A–4(8)	ML–CL CL ML–CL
Enon	69	Mixed basic & acidic schist and metabasalt	0–6 9–20 32–42	Ap B2 C	114 108 112	16		86 100 97	78 96 93	70 92 88	58 84 81	52	38 68 63	18 49 39	12 35 25	27 48 35	5 24 13	A–4(5) A–7–6(15) A–6(9)	ML–CL CL ML–CL
Fairfax	32	Sand, silt & clay of Coastal Plain overlaying Schist and granite	1–7 10–28 28–42 42–60	A2 B21,B22 C1 D1	112 107 110 105	13 18 16 19		87 96 89	83 94 85	79 91 82 100	63 81	53 67 62 69	35 54 48 54	19 43 35 39	12 37 28 32	23 51 42 40	3 23 16 18	A–4(6) A–7–6(15) A–7–6(10) A–7–5(13)	ML MH–CH ML–CL ML
Falsington [3]	84	Coastal Plain sandy and silty sediments	4–11 22–30 30–60	A Bg C	120 120 112	12 12 12			100 100	99 99	40 46 25	38 44 22	---- ---- ----	20 26 15	15 21 11	19 26 NP	5 11 NP	A–4(1) A–6(2) A–2–4(0)	SM–SC SC SM
Galestown	83	Mostly sands of Coastal Plain	0–8 8–48	Ap B,C	114 112	12 12			100	95 95	19 18	17 16	15 14	13 10	8 6	NP NP	NP NP	A–2–4(0) A–2–4(0)	SM SM
Glenelg	55	Micaceous schist	0–3 3–27 27+	Ap A3,B C	106 102 99	16 21 20		91 97 100	86 99	87 94 86	70 80 82	62 74 72	42 57 41	24 38 15	16 29 8	30 48 48	5 17 5	A–4(7) A–7–5(12) A–5(9)	ML ML ML
Glenville	10	Micaceous schist	0–3 3–27 27+	Ap A3,B C	---- ---- 107	---- ---- 16		96 96	95 96 73	90 90 70	53 66 50	---- ---- ----	---- ---- ----	---- ---- 12	---- ---- 7	NP 28 NP	NP 7 NP	A–4(4) A–4(6) A–4(3)	ML–CL SM SM
Hiwassee	88	Alluvium on terrace	0–5 15–67	Ap B2	101 91	20 29		99	100 99	85 97		45 89	27 85	12 77	7 71	37 59	4 21	A–4(6) A–7–5(16)	ML MH
Hyattsville	6	Colluvium from Coastal Plain sediments	1–4 12–15	Ap B2	---- ----	---- ----		99 99	98 98	90 89	64 67		49 49	32 27	25 20	43 29	19 9	A–7–6(10) A–4(6)	CL CL
Iredell	48	Diabase	0–7 11–28 29–32	Ap B2 C	111 93 121	16 26 15		98 100	98 100 97	86 94 69	76 84 43	72 81 35	26	28 63 17	17 57 14	27 80 36	5 50 15	A–4(8) A–7–5(20) A–6(3)	ML–CL CH SC
Kelly	79	Mixed Triassic shale and diabase	0–7 7–16 16–25 25–39	Ap B21 B22 B3	107 109 101 87	17 18 22 30		100 100 100	99 98 99 100	95 94 97 99	89 90 94 98	87 89 92 97	67 73 79 89	56 75	18 30 48 69	27 38 60 98	4 14 33 64	A–6(8) A–6(10) A–7–6(20) A–7–5(20)	ML–CL CH CH
Kempsville [6]	56	Coastal Plain sediments	0–12 45–60	Ap B C	---- ----	---- ----		80–100 55–100 55–100	75–100 50–100 50–100	45–90 35–90 10–85	25–65 20–70 5–55	----	----	----	----	20 20–40	NP–7 3–20 NP–15	A–2 A–1 A–1,A–2 A–4,A–6 A–1,A–2 A–4	ML,CL–ML SM,SM–SC CL,CL–ML SC,SM–SC CL,SC SM,CM
Lenoir	53	Silt, and of Coastal Plain	1–6 6–15 15–40 47–67	A2 B21 B22 C	101 106 99 116	20 18 23 14		100	100	99 100 100 99	94 97 96 65	92 95 94 50	73 76 82 30	40 47 66 22	25 30 53 18	36 33 59 26	8 10 30 8	A–4(8) A–7–6(20)	ML ML–CL MH–CH CL

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ENGINEERING TEST DATA [1]

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STD. NO.

SOIL			POSITION FROM GROUND SURFACE		MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION									CLASSIFICATION	
Series	No	PARENT MATERIAL	Depth (mm)	Horizon	Max. Dry Density	Optimum Moisture	% Passing Sieve				% Smaller Than					LL	PI	AASHTO	Unified
							76.2 mm	4.75 mm	2.0 mm	.425 mm	.075 mm	.05 mm	.02 mm	.005 mm	.002 mm				
Elkok	24	Micaceous schist	0–229 305–889 1270–1397	A3 C2	106 100 103	17 23 21	100	96 95 76	94 93 70	91 91 66	82 84 50	77 83 45	60 72 34	33 54	21 46 13	30 55 42	6 22 2	A–4(8) A–7–5(16) A–5(3)	ML–CL MH SM
Elkton	85	Sand, silt, and clay of Coastal Plain	102–279 279–991 1245–1524	A2 B2g C	107	16 15 13				100 100 100	91 92 81	83 84 62	54 62	27 36 17	19 28 15	30 34 23	8 17 6	A–4(8) A–6(11) A–4(8)	ML–CL CL ML–CL
Enon	69	Mixed basic & acidic schist and metabasalt	0–152 229–508 813–1067	Ap B2 C	114 108 112	14	78 96 93	86 100 97	70 92 88		58 84 81	52 82	38 68 63	18 49 39	12 35 25	27 48 35	5 24 13	A–4(5) A–7–6(15) A–6(9)	ML–CL CL–CL ML–CL
Fairfax	32	Sand, silt & clay of Coastal Plain overlaying Schist and granite	25–178 254–711 711–1067 1067–1524	A2 B21,B22 C1 D1	112 107 110 105	13 18 16 19	83 94 85	87 96 89	79 91 82 100		63 74 61	53 67 62 69	35 54 48 54	19 43 35 39	12 37 28 32	23 51 42 40	3 23 16 18	A–4(6) A–7–6(15) A–7–6(10) A–7–5(13)	ML MH–CH ML–CL ML
Faliington [3]	84	Coastal Plain sandy and silty sediments	102–279 559–762 762–1270	A Bg C	120 120 112	12 12 12	100 100	99 99 [illegible]	95 95		40 46 25	38 44 22	---- ----	20 26 15	15 21 11	19 28 NP	5 11 NP	A–4(1) A–6(2) A–2–4(0)	SM–SC SC SM
Galestown	83	Mostly sands of Coastal Plain	0–203 203–1219	Ap B,C	114 112	12 12	100 100	95 95	87 94		19 18	17 16	15 14	13 10	8 6	NP NP	NP NP	A–2–4(0) A–2–4(0)	SM SM
Glenelg	55	Micaceous schist	0–76 76–686 686+	Ap A3,B C	106 102 99	16 21 20	91 97 100	87 94 98	70 80 82		62 74 72	42 57 41	24 38 15	16 29 8	30 48 48	5 17 5	A–4(7) A–7–5(12) A–5(9)	ML ML ML
Glenville	10	Micaceous schist	0–76 76–686 686+	Ap A3,B C	---- ---- 107	---- ---- 16	96 97 [illegible]	96 97 [illegible]	95 96 73		53 66 50	---- ---- ----	---- ---- ----	---- ---- ----	---- ---- ----	NP NP 28	NP NP 7	A–4(4) A–4(6) A–4(3)	ML ML–CL SM
Hiwassee	88	Alluvium on terrace	0–127 381–1702	Ap B2	101 91	20 29	100 99	99	85 97	70	66 80	45 69	27 85	12 77	7 71	37 59	4 21	A–4(6) A–7–5(16)	ML MH
Hyattsville	6	Colluvium from Coastal Plain sediments	25–102 305–381	Ap B2	---- ----	---- ----	99 99	99 99	98 98	90 89	64 67	60 [illegible]	49 49	32 27	25 20	43 29	19 9	A–7–6(10) A–4(6)	CL CL
Iredell	48	Diabase	0–178 279–660 737–813	Ap B2 C	111 93 120	26 15	98	100	98 100 97	86 94 69	76 84 43	72 81 35	54 [illegible]	28 63 17	17 57 14	27 80 36	5 50 15	A–4(8) A–7–5(20) A–6(3)	ML–CL CH SC
Kelly	79	Mixed Triassic shale and diabase	0–178 178–406 406–635 635–991	Ap B21 B22 B3	107 109 101 87	17 18 22 30	100 100 100	100 98 99 100	99 98 99 100	95 94 97 99	89 90 94 98	87 89 92 97	67 73 79 89	31 [illegible]	18 30 48 69	27 38 60 98	4 14 33 64	A–4(8) A–6(10) A–7–6(20) A–7–5(20)	ML–CL ML–CL CH CH
Kempsville [6]	56	Coastal Plain sediments	0–305 [illegible] 1143–1524	Ap B C	---- ---- ----	---- ---- ----	80–100 55–100 55–100	75–100 50–100 50–100	45–90 35–90 10–85	25–65 20–70 5–55	---- ---- ----	---- ---- ----	---- ---- ----	---- ---- ----	---- ---- ----	20 20–40 NP–15	NP–7 3–20	A–2 A–1–A–2 A–4A–6 A–1A–2 A–4	ML,CL–ML SM,SM–SC CL,CL–ML SC,SM–SC CL,SC SM,CM
Lenoir	53	Sandstone, and [illegible] of Coastal Plain	25–152 152–381 381–1016 1194–1702	A2 B21 B22 C	101 106 99 116	20 18 23 14	100	100	99 100 100 99		94 97 96 65	92 95 94 50	73 76 82 30	40 47 66 22	25 30 53 18	36 33 59 26	8 10 30 8	A–4(8) A–4(8) A–2–6(20)	ML ML–CL MH–CH CL

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SOIL			POSITION FROM GROUND SURFACE		MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION											CLASSIFICATION	
							% Passing Sieve					% Smaller Than				LL	PI	AASHTO	Unified
Series	No	PARENT MATERIAL	Depth (in)	Horizon	Max. Dry Density	Optimum Moisture	3"	No. 4 (4.76mm)	No. 10 (2.0mm)	No. 40 (.42mm)	No. 200 (.74mm)	.05 mm	.02 mm	.005 mm	.002 mm				
Lloyd	66	Greenstone schist	0–3	A1	91	24		98	97	92	79	73	68	26	20	47	12	A-2-4(0)	ML
			3–16	B22	90	29			100	96	95	93	80	71	61	80	35	A-7-5(10)	MH
			16–28	B3	94					100	96	96		55	42	63	25	A-7-5(18)	MH
Louisburg	63	Granite gneiss	3–16	A2	122	9		100	97	65	30		18	12	7	18	NP	A-2-4(0)	SM
			16–28	C	119	11		100	99	67	30		16	10	6	23		A-2-4(0)	SM
Lunt	49	Sand, silt and clay of Coastal Plain	0–9	Ap	120	12			100	64	41	39	31	20	13	29	6	A-4(1)	SM–SC
			12–26	B21	106	18	100		100	85	75	75	66	46	35	55	18	A-7-6(18)	SC
			45–60	C	116	13			62	43	25	25	22	19	15	49	24	A-2-7(2)	ML–CL or CL
Manassas	14	Colluvium from soils in Triassic area, mainly Penn and Bucke	0–12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A-4,A-6	CL
			12–27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A-4,A-8	ML–CL or CL
			27–56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A-4,A-8	ML
Manor	21	Micaceous schist	0–8	Ap	107	17		98			72	60	40	21	15	34	4	A-4(7)	ML
			8–36	C	102	19			100	95	73	61	37	14	6	35	1	A-4(6)	
Marine Clay	118	Costal Plain silts and clays	—	C	—	—					85	82	79.2	7.25	62.5	67	56	A-7-5(20)	CH
Masada	43	Alluvium on terraces	0–8	A	—	—	0–20	75–100	50–100	40–85	30–70	—	—	—	—	30	NP–8	A–4	CM–ML
			8–53	B	—	—	0–20	55–100	50–100	30–80	20–95	—	—	—	—	45–65	18–35	A–4,A–6	CC,CL
			53–57	C	—	—	0–40	55–100	50–100	30–80	15–70	—	—	—	—	30–45	8–20	A–4,A–6	CC,CL
Metapeak	45	Sand, silt and clay of Coastal Plain	2–8	A2	111	15			100	99	68	73	54	29	20	23	4	A–4(8)	ML–CL
			22–38	B2	111	17				100	85	69	55	41	33	37	15	A–6(10)	CL
			44–62	C1	114	15				100	85	58	40	29	24	29	9	A–4(7)	CL
Mattapex	40	Sand, silt and clay of Coastal Plain	0–8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A–4	ML–CL or CL SC or SM
			8–34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A–6	
			34+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A–2,A–4	
Mayodan	132	Triassic shale and sandstone conglomerate	0–8	A	—	—	0–5	90–100	90–100	50–75	30–85	—	—	—	—	36	NP–5	A–2,A–4	SM,ML SM–SC MH,CH
			8–47	B	—	—	0–2	95–100	95–100	95–100	50–90	—	—	—	—	60–80	28–40	A–7	
			47–89	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Meadowville	20	Colluvium within Peidmont Upland	0–14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A–4	MH–CL or CL
			14–48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A–4,A–6	CL
Mecklenburg	40	Diabase	0–8	A	107	19		98	98	90	75	71	56	34	22	35	11	A–6(8)	ML–CL
			8–32	B	93	27			100	92	79	75	63	49	40	61	28	A–7–5(19)	MH
			32–48	C	119	15		99	86	59	35	30	22	18	15	34	12	A–2–6(0)	SM–SC
Mixed alluvial land	1	Fluvial adciments along streams and lowlands			Plain	—	Materials		Highly	Variable	—	SUBJECT	TO	FREQUENT	FLOODING				
Montalto	28	Diabase	0–7	Ap	103	22		93	93	82	66	61	48	32	22	30	12	A–6(7)	ML
			7–18	B2	98	27		98	96	92	76	72	61	49	42	52	22	A–7–5(15)	MH–CH
			18–27	B3	97	26			100	89	68	63	52	41	36	52	22	A–7–6(13)	MH–CH
			27–37	C	104	21		96	94	73	52	49	37	27	24	45	16	A–7–6(6)	ML

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STD. NO.

SOIL		PARENT MATERIAL	POSITION FROM GROUND SURFACE		MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION % Passing Sieve						% Smaller than		LL	PI	CLASSIFICATION	
Series	No		Depth (mm)	Horiz.	Max. Dry Density	Optimum Moisture	76.2 mm	4.75 mm	2.0 mm	.425 mm	.075 mm	.05 mm	.02 mm	.005 mm	.002 mm			AASHTO	Unified
Lloyd	86	Greenstone schist	0–76	A1 B22 B3	91 90 94	24 29		98	97 100	92 99 100	79 95 98	73 93 96	55 80	26 71 55	20 61 42	47 80 63	12 36 25	A–2–4(0) A–7–5(10) A–7–5(18)	ML MH MH
Louisburg	63	Granite gneiss	76–406 406–660	A2 C	122 119	9 11		100 100	97 98	65 67	30 30	24	18 16	12 10	7 8	18 23	1 NP	A–2–4(0) A–2–4(0)	SM SM
Lunt	49	Sand, silt and clay of Coastal Plain	0–229 305–660 1143–1524	Ap B21 C	120 106 116	12 18 13	100	69	100 100 62	64 85 43	41 75	39 75 25	31 66 22	20 48 19	13 35 15	29 59 49	6 18 24	A–2–7(2) A–4–8	SM–SC CH SC ML–CL or CL
Manassas	14	Colluvium from soils in Triassic area, mainly Penn and Bucks	0–305 305–686 686–914	— — —	— — —	— — —	100		— — —			— — —	— — —	— — —	— — —	— — —	— — —	A–6–6 A–6–6	CL ML–CL or CL
Manor	21	Micaceous schist	0–152 203–914	Ap C	107 102	17 19		98		99 95	72 73 85	60 61 82	40 37 79.2	21 14 7.25	15 6 62.5	34 35 87	4 1 56	A–4(7) A–4(8) A–7–5(20)	ML ML CH
Marine Clay [6]	118	Coastal Plain silts and clays	----	C	—	—												A–4 A–4,A–6 A–4,A–6	CM–ML CC,CL CC,CL
Masada [6]	43	Alluvium on terraces	0–203 203–1346 1346–1448	A B C	— — —	— — —		75–100 55–100 55–100	70–100 50–100 50–100	45–85 30–85	30–70 20–95 15–70							A–4(8) A–6(10) A–4(7)	ML–CL CL CL
Metapeak	45	Sand, silt and clay of Coastal Plain	51–203 559–914 1118–1321	A2 B2 C1	111 111 114	15 17 15			100	99 100 100	68	73 69 58	54 55 40	29 41 29	20 33 24	23 37 29	4 15 9	A–4 A–6 A–2,A–4	ML–CL or CL SC or SM
Mattapex	40	Sand, silt and clay of Coastal Plain	0–203 203–864 864+	— — —	— — —	— — —		— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	A–4 A–6 A–2,A–4	ML–CL or CL SC or SM
Mayodan [5]	132	Triassic shale and sandstone conglomerate	0–203 203–1194 1194–2261	A B C	— — —	— — —		90–100 95–100	90–100 95–100	50–75 95–100	30–85 50–90	—	—	—	—	36 60–80	NP–5 28–40	A–2,A–4 A–7	SM,ML SM–SC MH,CH —
Meadowville	20	Colluvium within Peidmont Upland	0–356 356–1219	— —	— —	— —	0–5 0–2	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	A–4 A–4,A–6	ML–CL or CL CL
Mecklenburg	40	Diabase	0–203 203–813 813–	— C	107 93 119	19 27 15	Materials	98 99	98 100 86	90 92 59	75 79 35	71 75 30	56 63 22	34 48 18	22	35 61 34	11 28 12	A–6(8) A–7–5(19) A–2–6(0)	ML–CL MH SM–SC
Mixed alluvial land	1	Fluvial sediments along streams and in drainageways	0–178 178–457 457–686 686–940	Ap B2 B3 C	Flood Plain	— Highly Variable	SUBJECT TO	FREQUENT	FLOODING									A–6(7) A–7–5(15) A–7–5(13) A–7–5(6)	ML–CH MH–CH MH–CH ML
Montalto	28	Diabase			103 96 97 104	22 27 26 21		93 98 96	93 96 100 94	82 92 89 73	66 76 68 52	61 72 63 48	48 61 52 37	32 49 41 27	22 42 36 24	30 52 52 45	22 22 22 16		

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ENGINEERING TEST DATA[1]

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PLATE NO. 9-11

STD. N

SOIL Series	No.	PARENT MATERIAL	POSITION FROM GROUND SURFACE Depth (in)	Horizon	MOISTURE DENSITY Max. Dry Density	Optimum Moisture	GRAIN SIZE DISTRIBUTION % Passing Sieve 3"	No. 4 (4.76mm)	No. 10 (2.0mm)	No. 40 (.42mm)	No. 200 (.74mm)	% Smaller Than .05 mm	.02 mm	.005 mm	.002 mm	LL	PI	CLASSIFICATION AASHTO	Unified
Orange	59	Gr[illegible]stone	0–9	Ap	113	14		100	96	88	81	77	60	30	17	23	[illegible]	A–4(8)	ML
			9–23	B21,B22	166	15		99	92	84	77	72	54	50	19	29		A–4(8)	CL
			23–41	B2m	91	28		100	97	93	90	87	77	65	60	86	[illegible]	A–7–5(20)	CH
Othello [3]	39	Coastal Plain sediments	0–10	A	120	11			100	99	62	57	---	19	12	[illegible]	4	A–4(5)	ML–CL
			10–30	Bg	113	15			100	99	71	68	---	38	31	35	21	A–6(12)	CL
			30–50	C	112	13				100	38	28	---	10	9	NP	NP	A–4(1)	SM
Penn [2] (fine sandy loam) [4]	67	Sandstone	0–8	A	---	---	---	---	---	---	---	---	---	---	---	18	2	A–2	SM
			8–15+	C	---	---	---	---	---	---	---	---	---	---	---	26	5	A–4	ML–CL
Penn (loam) [4]	75	Siltstone and shaly sandstone	0–8		113	14	---	100	99	93	84	78	---	26	16	27	4	A–4(8)	ML–CL
			8–19	C	115	14			100	98	87	77	---		15	26	3	A–4(8)	ML
Penn [3] (Shaly silt loam) [4]	77	Shale and sandstone	3–14	B and C	112	15	100	89	72	55	51	51	---	23	13	31	7	A–4(3)	ML–CL
			14–36	C		15	100	48	40	32	28	27	---	14	8	29	7	A–2–4(0)	GM–GC
Penn (silt loam) [4]	73	Triassic shale and siltstone	0–8	Ap	113	14		100	99	93	84	78	[illegible]	26	16	27	4	A–4(8)	ML–CL
			8–19	C1	115	14			100	98	87	77	46	22	15	26	3	A–4(8)	ML
			19+	D	117		100	35	28	24	10	[illegible]	---	---	---	32	11	A–2–6(0)	GC
Raritan [3]	92	Alluvium on Triassic terrace shales and sandstone	0–8	A	---	---	---	---	---	---	---	---	---	---	---	33	8	A–4	ML–CL
			8–37	B	---	---	---	---	---	---	---	---	---	---	---	75	50	A–7–5	CH–ML
			37+	R	---	---	---	---	---	---	---	---	---	---	---	28	7	A–2–4	GM–GC
Readington	273	Triassic shale and siltstone	0–7	Ap	100	21		[illegible]	99	93	84	82	68	42	30	43	16	A–7–6(11)	ML–CL
			12–28	B22	110	18		[illegible]	99	96	92	89	68	47	38	45	24	A–7–6(5)	CL
			34–48	C	113	16		97	95		86	84	66	43	32	38	19	A–6(12)	CL
Rowland	12	Alluvium from Triassic soils	0–8	Layer 1	112	16		100	[illegible]	91	75	70	49	23	14	27	4	A–4(8)	ML–CL
			14–21	Layer 2	112	15			[illegible]	94	85	76	51	24	16	27	5	A–4(8)	ML–CL
			21–36	Layer 3	115	15			[illegible]	96	52	44	32	20	15	25	3	A–4(3)	ML
Sassafras	54	Sand, silt and clay of Coastal Plain	4–10	A2	122	10			[illegible]	[illegible]	41	38	27	15	9	15	2	A–4(1)	SM
			14–26	B2	117	14			100	[illegible]	46	45	37	27	24	27	10	A–4(2)	SC
			38–50	C	111	12			100	97	13	13	13	11	10	NP	NP	A–2–4(0)	SM
Wahadkee	5	Alluvium	0–8	A	95–105	24–28			100	85–100	50–95	---	---	---	---	25–52	11–22	A–6, A–7	CL, MH ML, CH
			8–92	B					100	90–100	[illegible]	---	---	---	---	30–45	11–20	A–6, A–7	ML, CL
Woodstown [3]	34	Coastal Plain sediments	6–11	A	117	[illegible]			100	90	36	35	---	15	12	20	5	A–4(0)	SM–SC
			22–36	B	125				100	89	38	[illegible]	---	19	14	20	6	A–4(1)	SM–SC
			36–60	C	121	[illegible]			100	86	20	[illegible]	---	11	9	NP	NP	A–2–4(0)	SM
Worsham	8	Colluvium from schist and granite	0–7	A	[illegible]	16			100	93	72	65	---	33	26	31	9	A–4(7)	ML–CL
			10–46	B	[illegible]	20			100	97	86	82	---	58	48	60	34	A–7–6(20)	CH
			46–62	C	[illegible]13	14			100	92	68	62	[illegible]	41	35	48	26	A–7–6(14)	CL

FOOTNOTES:

[1] Samples were tested in accordance with standard procedures of AASHTO in a cooperative program involving state highway departments, universities, or colleges, and FHWA. Moisture density tests were performed in accordance with AASHTO Test Designation T99.57; Mechanical analysis according to AASHTO designation T88 AASHTO Classification is based on "Standard Specifications for Highway Materials and Methods of Sampling and Testing" (Part 1 Edition 7): "The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes." AASHTO designation M145–49. Unified Classification is based on the "Unified Soil Classification system." Technical Memorandum No. 3 357, Volume 1, Waterways Experiment Station, Corps of Engineers, 1953.

[2] "Soils of Prince William County," Report No 8; Prepared by Prince William County in cooperation with the Agronomy Department of VPI and the USDA Soil Conservation Service.

[3] "Engineering Soil Classification for Residential Development". FHA No 373; revised November, 1961; compiled and edited by the Federal Housing Administration Architectural Standards Division, Technical Studies Staff from data prepared by VPI, FHWA and state highway departments, universities, and colleges.

[4] Soil Series (ex Bucks) are often separated during field mapping according to the soil types (ex: Bucks loam and Bucks silt loam). The soil type is determined by the texture of the surface horizon, which often indicates differences in the soil parent material, and throughout the soil profile. These differences may affect the engineering properties of the Soil Series.

[5] "Soil Survey of Hanover County, Virginia," Prepared by: the USDA Soil Conservation Service in cooperation with VPI.

[6] Lab data obtained from: Geotechnical Engineering Report, considered to be typical of "Marine Clays" in the County, LL typically range from 50–90, with PI greater than 30.

ENGINEERING TEST DATA[1]

Ref. Sec. 11-0409
Rev. 1-00

PLATE NO 9M-11

STD N

SOIL Series		PARENT MATERIAL	POSITION FROM GROUND SURFACE Depth (mm)	Horizon	MOISTURE DENSITY Max. Dry Density	Optimum Moisture	GRAIN SIZE DISTRIBUTION % Passing Sieve 76.2 mm	4.75 mm	2.0 mm	.425 mm	.075 mm	% Smaller Than .05 mm	.02 mm	.005 mm	.002 mm	LL	PI	CLASSIFICATION AASHTO	Unified
Orange	59	Gr[illegible]stone	0–229	Ap	113	14		100	96	88	81	77	60	30	17	23	3	A–4(8)	ML
			229–584	B21,B22	166	15		99	92	84	77	72	54	30	19	29		A–4(8)	CL
			584–1041	B2m	91	28		100	97	93	90	87	77	65	60	86		A–7–5(20)	CH
Othello [3]	39	Coastal Plain sediments	51–254	A	120	11			100	99	62	57	---	19	12	35	4	A–4(5)	ML–CL
			25–762	Bg	113	15			100	99	71	68	---	38	31	55	21	A–6(12)	CL
			89–1016	C	112	13				100	38	28	---	10	9	NP	NP	A–4(1)	SM
Penn [2] (fine sandy loam) [4]	67	Sandstone	0–203	A	---	---	---	---	---	---	---	---	---	---	---	18	2	A–2	SM
			203–381+	C	---	---	---	---	---	---	---	---	---	---	---	26	5	A–4	ML–CL
Penn (loam) [4]	75	Siltstone and shaly sandstone	0–203		113	14	---	---	---	---	---	---	---	26	16	27	4	A–4(8)	ML–CL
			203–483	C	115	14	---	100	99	93	84	78	---		15	26	3	A–4(8)	ML
Penn [3] (Shaly silt loam) [4]	77	Shale and sandstone	76–356	B and C	112	15	100	89	72	55	51	77	---	23	13	31	7	A–4(3)	ML–CL
			356–914	C		15	100	48	40	32	28	51	---	14	8	29	7	A–2–4(0)	GM–GC
Penn (silt loam) [4]	73	Triassic shale and siltstone	0–203	Ap	113	14		100	99	93	84	27	---			27	4	A–4(8)	ML–CL
			203–483	C1	115	14			100	98	87	78	---	26	16	26	3	A–4(8)	ML
			483+	D	117		100	35	28	24	10	77	46	22	15	32	11	A–2–6(0)	GC
Raritan [3]	92	Alluvium on Triassic terrace shales and sandstone	0–203	A	---	---	---	---	---	---	---	---	---	---	---	33	8	A–4	ML–CL
			203–940	B	---	---	---	---	---	---	---	---	---	---	---	75	50	A–7–5	CH–ML
			940+	R	---	---	---	---	---	---	---	---	---	---	---	28	7	A–2–4	GM–GC
Readington	273	Triassic shale and siltstone	0–178	Ap	100	21			99	93	84	82	68	42	30	43	16	A–7–6(11)	ML–CL
			305–711	B22	110	18			99	96	92	89	68	47	38	45	24	A–7–6(5)	CL
			864–1219	C	113	16		97	95		86	84	66	43	32	38	19	A–6(12)	CL
Rowland	12	Alluvium from Triassic soils	0–203	Layer 1	112	16		100	[illegible]	91	75	70	49	23	14	27	4	A–4(8)	ML–CL
			356–533	Layer 2	112	15				94	85	76	51	24	16	27	5	A–4(8)	ML–CL
			533–914	Layer 3	115	15				96	52	44	32	20	15	25	3	A–4(3)	ML
Sassafras	54	Sand, silt and clay of Coastal Plain	102–254	A2	122	10			100	[illegible]	41	38	27	15	9	15	2	A–4(1)	SM
			356–711	B2	117	14			100		46	45	37	27	24	27	10	A–4(2)	SC
			965–1270	C	111	12			100	97	13	13	13	11	10	NP	NP	A–2–4(0)	SM
Wahadkee	5	Alluvium	0–203	A	95–105	24–28			100	85–100	50–95	---	---	---	---	25–52	11–22	A–6, A–7	CL, MH ML, CH
			203–2337	B					100	90–100	[illegible]	---	---	---	---	30–45	11–20	A–6, A–7	ML, CL
Woodstown [3]	34	Coastal Plain sediments	152–279	A	117	[illegible]			100	90	36	35	---	15	12	20	5	A–4(0)	SM–SC
			559–914	B	125				100	89	38	[illegible]	---	19	14	20	6	A–4(1)	SM–SC
			914–1524	C	121	10			100	86	20	[illegible]	---	11	9	NP	NP	A–2–4(0)	SM
Worsham	8	Colluvium from schist and granite	0–178	A	11[illegible]	16			100	93	72	65	---	33	26	31	9	A–4(7)	ML–CL
			254–1168	B		20			100	97	86	82	---	58	48	60	34	A–7–6(20)	CH
			(1168–1575)	C	113	14			100	92	68	62	---	41	35	48	26	A–7–6(14)	CL

FOOTNOTES:

[1] Samples were tested in accordance with standard procedures of AASHTO in a cooperative program involving state highway departments, universities, or colleges, and FHWA. Moisture density tests were performed in accordance with AASHTO Test Designation T99.57; Mechanical analysis according to AASHTO designation T88 AASHTO Classification is based on "Standard Specifications for Highway Materials and Methods of Sampling and Testing"(Part 1 Edition 7);"The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes." AASHTO designation M145–49. Unified Classification is based on the "Unified Soil Classification system." Technical Memorandum No. 3 357, Volume 1, Waterways Experiment Station, Corps of Engineers, 1953.

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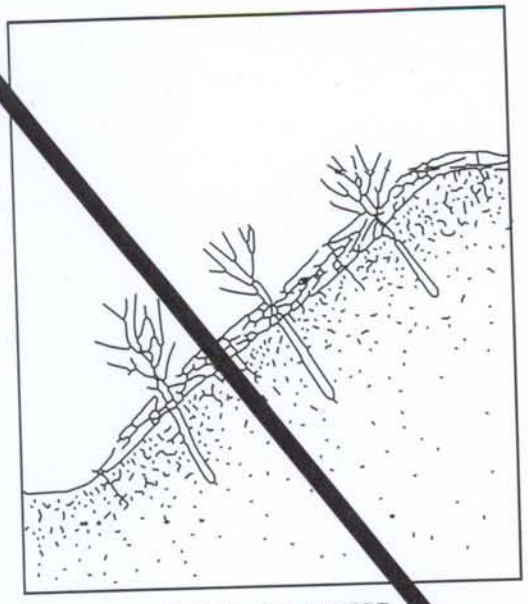
[6] Lab data obtained from: Geotechnical Engineering Report, considered to be typical of "Marine Clays" in the County, LL typically range from 50–90, with PI greater than 30.



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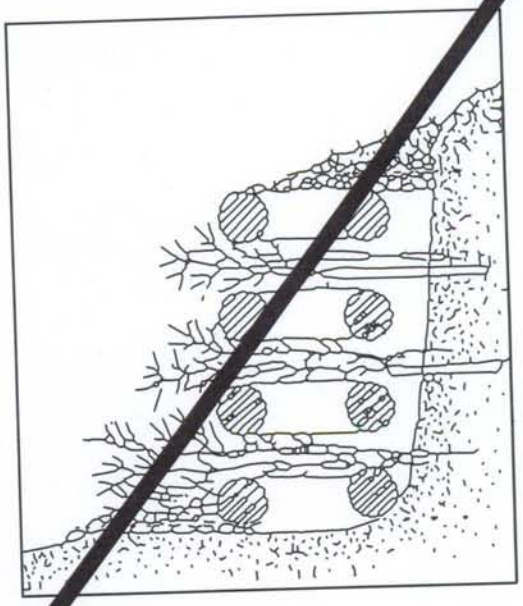
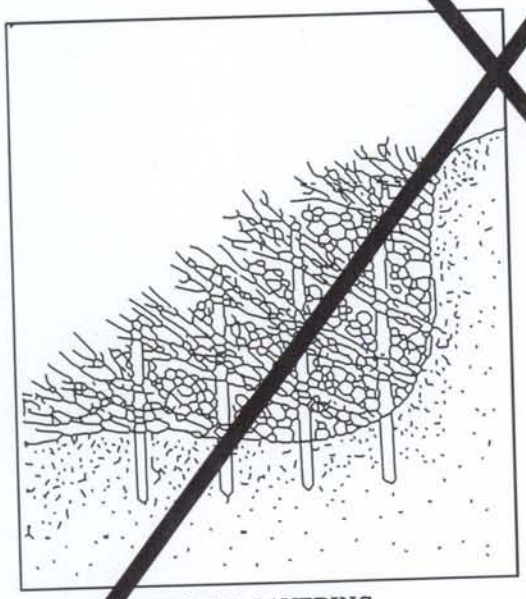


LIVE CRIB WALL



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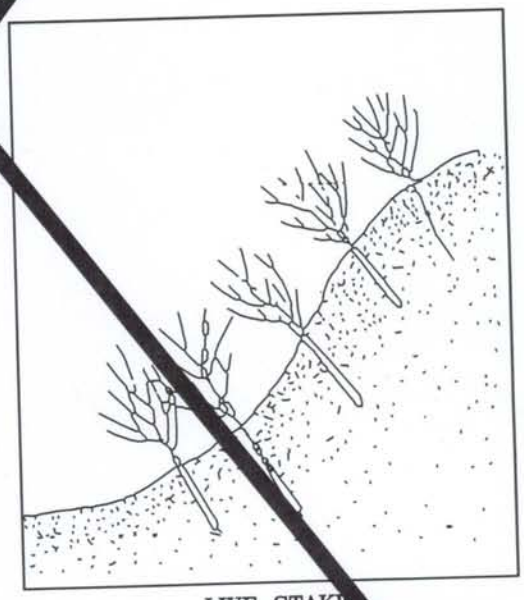
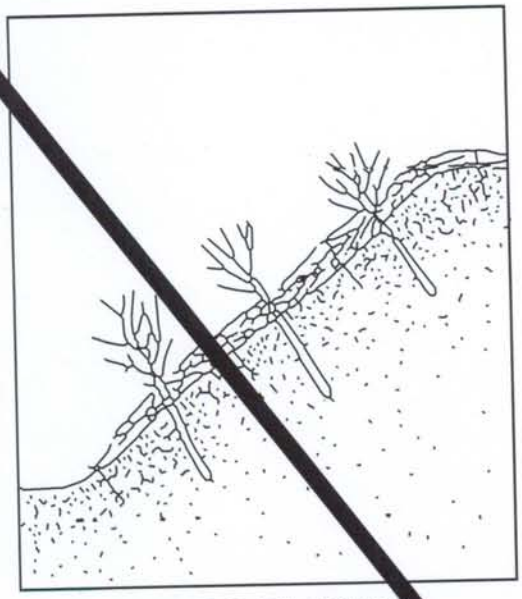


LIVE STAKE

Source: Erosion and Improvement Plan for Stream Valley Parks -- Fairfax County
Gauthier, Alvarado & Associates/Sheladia Associates

Ref: Sec. 11-0411.6	BIOTECHNICAL SLOPE PROTECTION	PLATE NO. 10-11	STD. NO.
Rev. 1-00			



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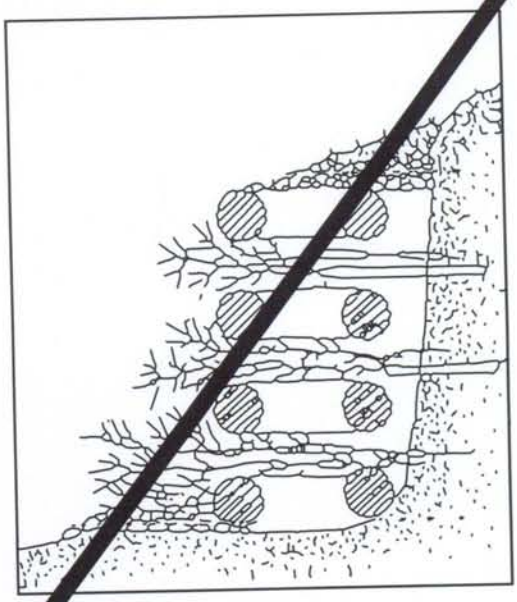

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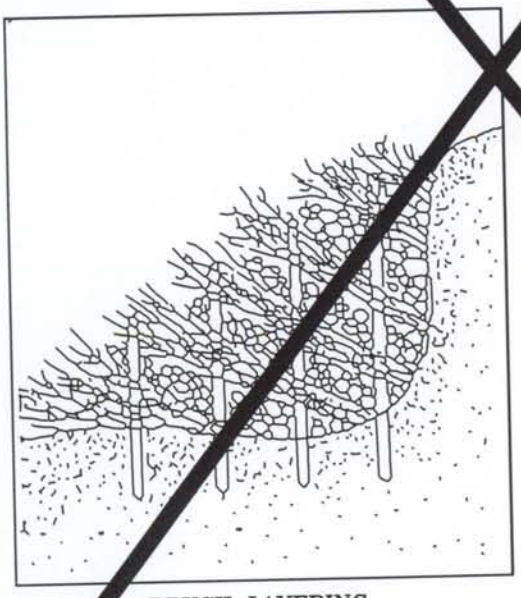

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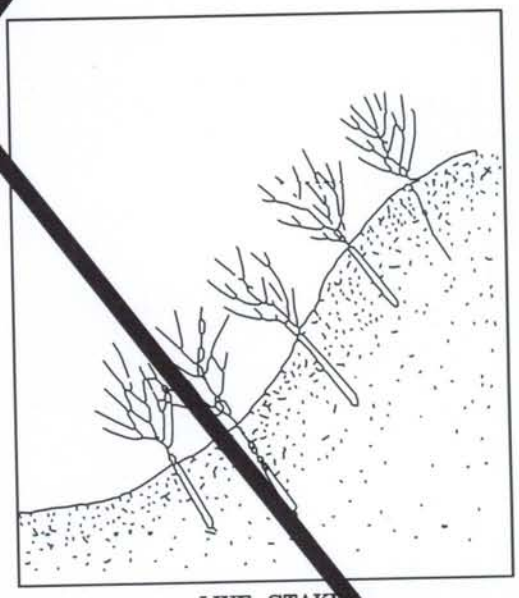

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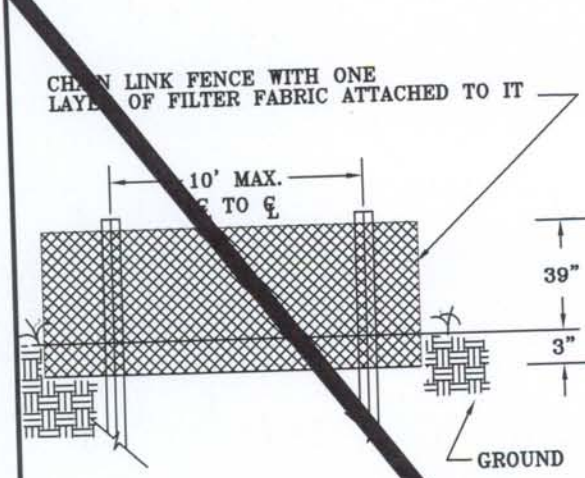
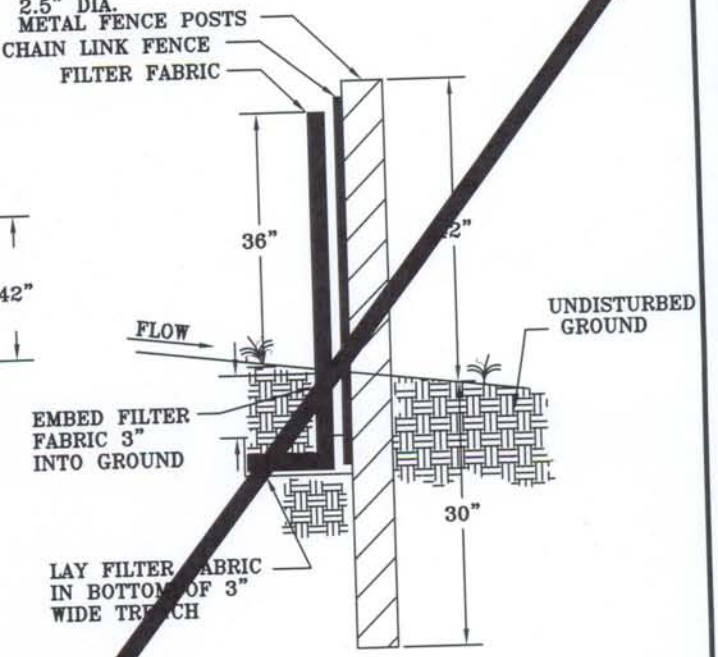
Ref. Sec. 11-0411.6	BIOTECHNICAL SLOPE PROTECTION	PLATE NO.	STD. NO.
Rev. 1-00		10M-11	



ELEVATION VIEW



SECTION VIEW

SSF X—X—X—X—X

SUPER SILT FENCE

NO SCALE

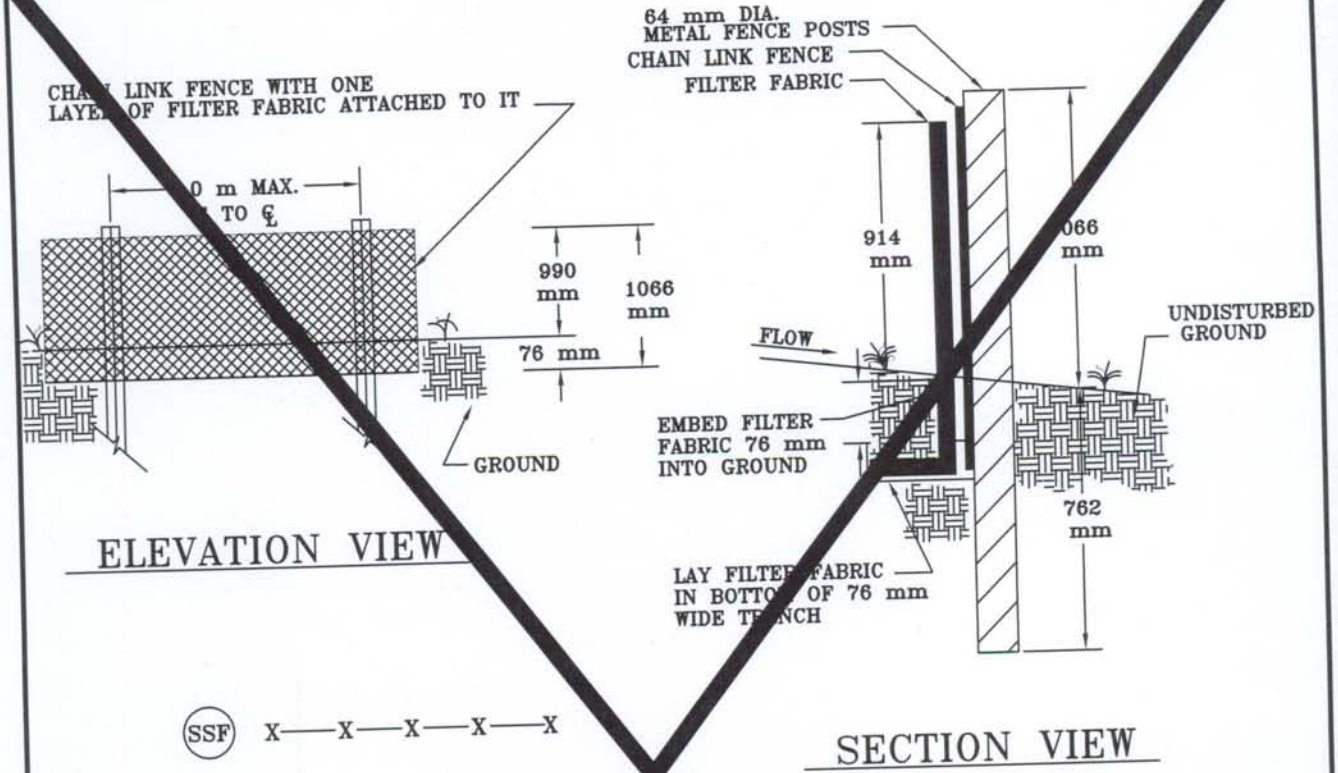
FENCING

Chain link fence shall be [illegible]" above grade with 3" embedded for a total fabric width of 42". The post shall be 4[illegible]" above grade with 30" placed below grade (without concrete) for a total length of 7[illegible]".

NOTES

1. Chain link fence shall be fastened securely to fence posts with wire ties.
2. Filter fabric shall be fastened securely to chain link fence with ties spaced horizontally 24" at the top and midsection.
3. Physical properties of the filter fabric shall conform to the latest edition of THE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK.
4. When two sections of filter fabric adjoin each other, they shall be overlapped by 6".
5. Maintenance shall be performed as needed and material shall be removed when sediment build-up reaches 50% of the height of the super silt fence.

Ref. Sec. 11-0110.3J	SUPER SILT FENCE NO SCALE	PLATE NO.	STD. NO.
Rev. 1-00		11-11	



SSF X—X—X—X—X

SUPER SILT FENCE
NO SCALE

FENCING

Chain link fence shall be 990 mm above grade with 76 mm embedded for a total fabric width of 1066 mm. The post shall be 1066 mm above grade with 762 mm placed below grade (without concrete) for a total length of 1828 mm.

NOTES

1. Chain link fence shall be fastened securely to fence posts with wire ties.
2. Filter fabric shall be fastened securely to chain link fence with ties spaced horizontally 610 mm at the top and midsection.
3. Physical properties of the filter fabric shall conform to the latest edition of THE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK.
4. When two sections of filter fabric adjoin each other, they shall be overlapped by 152 mm.
5. Maintenance shall be performed as needed and material shall be removed when sediment build-up reaches 50% of the height of the super silt fence.

Note: All units are in mm unless otherwise noted.

Ref. Sec. 11-0110.3J	SUPER SILT FENCE NO SCALE	PLATE NO.	STD. NO.
Rev. 1-00		11M-11	